





wine is ineligible for election, because, being only an "associate," as distinguished from a "member"—giving to those words the technical significance which the Constitution attaches to them—he is not entitled to vote. He says: "Clearly an Associate, being, as such, denied the right of voting in determining the action of the Society, will not be eligible to election as Director or Trustee." His theory is that the right to vote as a Director depends upon the right to vote as a member. The proposition is not sound. There is no connection between the two. The right to vote as a member depends upon membership alone; the right to vote as a Director depends upon the action of the elective body in delegating that right to the person chosen to exercise it.

As a matter of law, it is well settled that a corporate body is not bound to choose its directors from among its members, unless required to do so by statute or by its constitution.

"Any person of sound mind who is capable of acting as agent for another may be elected director or trustee of a corporation unless some special qualification is prescribed by the charter or by-laws of the company."—Morawetz on Private Corporations, sec. 505.

In the case of *State v. McDaniel* (22 Ohio State Reports 354) the Supreme Court of Ohio held that: "In the absence of a statute requirement, the discretion of the stockholders in electing directors is not limited to persons holding stock." And the same view was expressed by the Supreme Court of Massachusetts in *Wight v. Springfield & New London Railroad Co.* (117 Mass. R., 220). As none but the stockholders of business corporations are members thereof, or entitled to vote in the choice of directors, the analogy is complete.

The fact that Mr. Trautwine is only an "associate" member of the Society does not, therefore, render him ineligible for the office of Secretary.

BLAIR & BUDD.

#### The M. C. B. Coupler Lines.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with great interest your editorial on my letter published in your issue of the 14th inst., and again trespass on your valuable space with a few words of reply. First I should say that the credit, if any, for the invention of "the very promising coupler" belongs to Mr. Eastwick and not to me.

You seem to consider my suggestion for a series of official tests a good one, but doubt if it could be carried out. You have much better sources of information on this point than I, so I will not press it farther. You offer as a substitute for my plan the information obtained by each road from its own coupler service. I would agree with you if the officials of each road kept their records on a uniform plan and sent them to some committee of the Master Car Builders' Association who would tabulate and officially publish them. In the end the same result would be reached as if my suggestion were adopted. The form of report used by the Baltimore & Ohio Railroad, as shown in your issue of the 14th, is undoubtedly very good, but could you not suggest additions to it which would make the returns much fuller and more valuable? As you say, on June 6 you published the coupler record of the Chicago, Burlington & Quincy Railroad, but since then not a word have I noticed from any other railroad company. I feel sure from the interest your paper has always shown in this question that you must have applied to other roads for their records and been refused, but for what reason I cannot understand. Am I right or wrong in this conclusion?

In reply to my remarks about the contour lines you sum up as follows: The Association should say to inventors, "Our standard has been fixed; we shall not depart from it. This is exactly my position. At the Master Car Builders' Convention in 1887 (page 194) the Executive Committee reported as follows: "Your committee feel that the status of the problem at the present, as here stated, warrants them in making the recommendation that this Association recommend as a standard form of coupling the Janney type of coupler; that the Association procure one of the present make of Janney coupler, selection being made by a committee appointed for that purpose, and then all other forms of couplers that will automatically couple to and with this coupler under all conditions of service are to be considered as within the Janney type and conforming to the standard of this Association;" and requested that the question of its adoption should be submitted to a letter ballot (page 199). Mr. Cloud moved that the recommendation of the Executive Committee be adopted and acted upon (page 208). Mr. Cloud's motion was then carried by a vote of 33 to 14 (page 252). The result of the letter ballot 474 in favor, 194 against.

The committee fixed this standard and gave it out in April, 1888. At the meeting in June, 1888, the committee in reporting on this subject (page 104) said: "The standard of the Association is, therefore, with the publication of these lines, definitely fixed; and it is in the power of any inventor or manufacturer of couplers, now or hereafter, to determine for himself whether his coupler will automatically couple to and with this standard under all conditions of service. The railroad companies can, with equal facility, make this test with any coupler brought to their attention. Your committee feel that the members of the Association will be impressed with the desirability of making the test before

they adopt any particular make of coupler, to the end that absolute interchangeability will be secured."

To leave this carefully considered and clearly worded position is what I object to. Not on the ground as stated by some, that it would be bad faith towards coupler manufacturers, for this question is far too important to be affected by the personal interests of any individual, but on the grounds fully set forth by the committee in making their report to the convention in 1887, commencing page 187. Again, how can any inventor prove his lines to be better than the Janney if he is deprived of the privilege of putting his couplers in service. Drawings and wooden models have their place, but the only real test is actual service, and plenty of it.

You apparently misunderstood my statement that each set of lines has almost advantageous place for the centre point of revolution (of the knuckle). I know that all of the couplers at present offered, with a few unimportant exceptions, can be made to exactly conform to the Master Car Builders' lines. My contention was that each set of lines has a most desirable point for the centre of the revolution of its knuckle, considering the act of coupling together with the most effective distribution of metal. This point can be found, and when located the locking device is all that is left to perfect.

I do not agree with you that a coupler cannot be made, permitting a soft coupling, within permissible limit of wear; but that is a technical question, and is hardly in the line of the present discussion.

FREDERICK ROBERT.

#### The Chignecto Ship Railway.

[WITH AN INSET.]

The Isthmus of Chignecto separates the Bay of Fundy from the Gulf of St. Lawrence, making a loop in the coast line of over 600 miles. The Chignecto Ship Railway is to cut this loop to navigators by enabling loaded vessels to cross the intervening 17 miles of land with speed and safety. The different operations by which this is to be accomplished are simple and in everyday use. The novelty of the undertaking lies in the applica-



Geography of the Chignecto Ship Railway.

tion of these old devices to lifting ships from the water, transporting them a comparatively long distance at fair speed on rails to another harbor and replacing them in the water.

The upper part of the Bay of Fundy is called Chignecto Bay; this in turn ends in Cumberland Basin, where, at the mouth of La Planche River, the Amherst terminus is situated. From this the railroad stretches straight away to the Tidnish terminus in Baie Verte, a harbor of Northumberland Strait, which is that part of the Gulf of St. Lawrence south of Prince Edward Island.

In the following sketch it is proposed to briefly glance over the line, commencing at the Fundy end. Fig. 1 (see the inset) is a view looking southwest. In the background are the Minudie (Main à Dieu) marshes. The water is Cumberland Basin, which widens into a noble bay half a mile to the west. The engines and derricks at the water side are on the wharf, discharging materials from the vessels lying there. The stones piled on the right are for the lifting dock and entrance gate of the basin. The close row of piles in front, and to the left of the wharf, is the facing of the dyke running across the lower end of the excavation. This dyke is built on the surface of the marsh, and is about 5 ft. high, excepting where it crosses an old watercourse. Extreme high tides come to within 3 ft. of the top, and as these tides rise and fall at the rate of a foot in eight minutes they very soon leave it again. Coming down through the Tantramar marshes, which are at the left, is La Planche River.

The view shows almost high water and a broad

stream; at low water the surface is more than 40 ft. lower, and narrows down to less than 50 ft. in width. The landing wharf faces on the proposed entrance channel of the basin, about 8 ft. of which is excavated for a slip, and at low tide the vessels here lie in the mud about 30 ft. above the river. The brick building adjoining the chimney contains the boilers, a part of the building not yet roofed is for the engines and pumps, while the square tower behind is for the accumulator. To the left may be seen the tops of the derricks used in building the lifting dock. The shanty near the accumulator is the pump house of an artesian well 308 ft. deep, which supplies the works, stables and men's houses with water.

The excavation for the entrance gate or lock is almost completed and the building will shortly be commenced. This structure will be massive masonry to the same level as the top of the lifting dock. The gate will be some 17 ft. lower, that is to say, about 12 ft. below high water, spring tide, retaining a minimum depth of 32 ft. in the basin. The latter, extending from the gate to the lifting dock, is 500 ft. long by about 300 wide. The bottom is now approximately to grade.

Fig. 2 is from near the top of the incline used in excavating for the lifting dock. On either side are the walls of the lifting dock, which continue around in a circle to meet at the inner end, the last 30 ft. being extended 25 ft. further, to afford a narrow recess for bowsprits the side walls of which carry the tracks to a connection with those on the gridiron, the whole dock being about 275 ft. long. The cast steel bases are part of the hydraulic rams, of which there will be 10 on a side. The chambers shown in the masonry on the right are to contain these, the recesses in the back part of which are for the ends of the cross girders of the gridiron.

The rams are of the usual type, being composed of two cylinders, the inner one performing the functions of a piston and rod. These carry saddles extending out on either side over the cross girders, to which they are connected with eye bars of a length to permit the gridiron to descend to the bottom of the dock when the saddles are at their lowest point. Strongly braced ways on the top of the masonry guide and stay the cylinders when extended.

The gridiron is similar to a double track bridge floor, the cross girders corresponding to floor beams and the longitudinal ones to track stringers. In fact, if it were attached to trusses having panel points at the rams, the only strange feature of the floor would be the 64 ft. between the trusses.

The cradle is made up of flat cars of peculiar design, twice the ordinary length and nearly 40 ft. in width. They run on four lines of wheels, and are constructed in such a manner that the weight upon the wheels is evenly distributed. Keel blocks on the centre and adjustable bilge blocks on the sides afford bearings for the vessel. When a vessel is to be raised, a cradle is lowered to below the level of its keel. It is then hauled into the dock with a hydraulic capstan to a position over the centre of the cradle, which is then moved up to a bearing on the keel and the bilge blocks are hauled into position by means of tackle controlled from above.

The pumps are then started, and in less than ten minutes the gridiron reaches the level of the railroad. Connected castings not unlike the bolts of a lock in their action are now shot under the ends of the girders with hydraulic power, transferring the weight from the rams to the masonry, and making the gridiron an integral part of the railroad. Two locomotives are then coupled on and haul the cradle with its burden across the isthmus in less than two hours, and a reverse operation at the other dock speedily restores the vessel to the water. Traverse tables will permit vessels to pass each other.

Fig. 3 shows some of the track not ballasted. The rails are 110 lb. section, 6 1/4 in. in height, spliced with correspondingly heavy angle bars, and fastened with spikes that are in proportion. The sleepers are 9 ft. x 7 in. x 12 in., excepting the two at the joints, they being 27 ft. long and connecting all four rails. Stone ballast will be used throughout. Particular attention will be given to surfacing and lining, while special rolling load tests are provided for in the specifications. On a permanent way of this description, that is, an unbroken tangent without perceptible grades, a ship will travel as smoothly as "on a painted ocean."

Fig. 4 is from station 140 northeast and shows the Tantramar marshes and Fort Lawrence ridge. In this view also may be seen the Nova Scotian method of building fences on sills. The reason why fences are laid on sills in this climate is illustrated by how much the frost has lifted the top rail of the fence at the first telegraph pole on the left.

The roadway from this point of view to the woods is across a part of the Tantramar marshes, which are here composed of about 25 ft. of the softest mud, covered with a thin crust in places, and underlaid with hard pan. The embankment is of rock, borrowed for that purpose, and was filled about 8 ft. above grade to give additional weight. This has since been removed, and there is no doubt that the embankment is resting on the hard pan.

Fig. 5 is northeast from station 380, and shows Long Lake swamp, a floating bog of moss, about half a mile wide where the line crosses. The moss is excavated from seat of embankment practically to the hard bot-



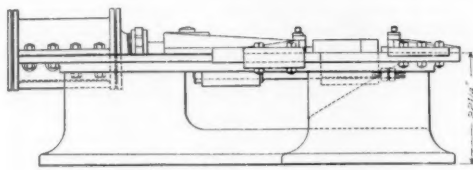


Fig. 1.

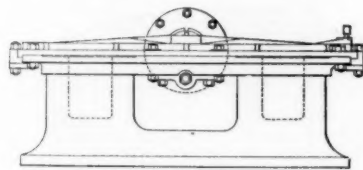


Fig. 2.

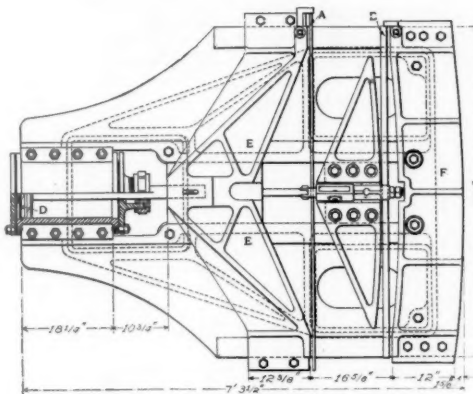


Fig. 3.

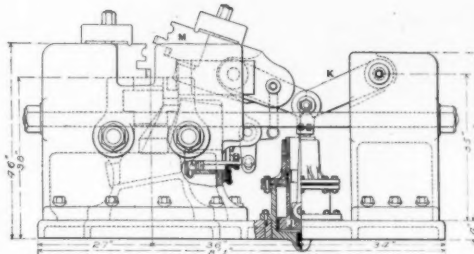


Fig. 4.

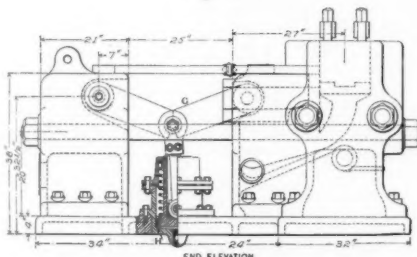


Fig. 5.

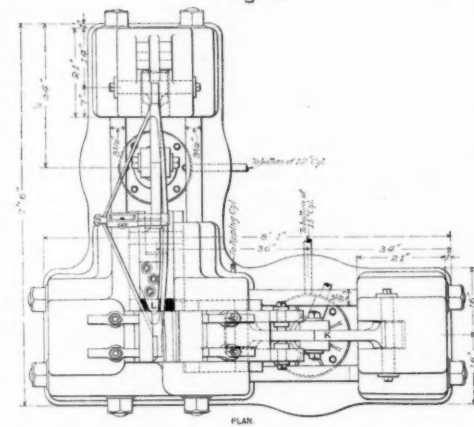


Fig. 6.

## BRAKE BEAM FORGING MACHINE.

By Mr. R. W. BAYLEY, Pittsburgh, Pa.

tom, which is only 6 ft. from the surface. In general, wherever peat or other boggy substances were found at the site of embankments the same course was pursued. The gap shown in this view is now crossed by a temporary trestle to permit immediate tracklaying, while the work of filling is constantly progressing.

From the woods seen here, for a distance of seven miles, the line runs through a primeval forest abounding with lakes and streams.

Fig. 6 shows the arch culvert for the diversion of the Tidnish River at station 779. The arch is 30 ft. span, 82 ft. long, and the masonry extends 12 ft. below the water to the solid rock.

Fig. 7 is a view of the great cutting at Tidnish, taken in July. The men and carts are digging a gullet to permit of easy access to the steam shovel, the top part of the cut having been previously wasted with scrapers. This cut extends from station 818 to 806, and for a great part of the distance is 30 to 35 ft. in depth. The wide road-bed, which is uniformly 40 ft. for the whole line, adds up quantities very fast, the contents of this cutting being about half a million cubic yards, 20 per cent. of which is solid rock. In the view is shown a traveling derrick of great simplicity and effectiveness hoisting out the rock which is being excavated single track width. The remainder of the rock will be taken out when the track is laid in this gullet and distributed along the line for ballast. Over the hill in the background a steam shovel and locomotive are at work removing a conglomerate of hard clay and boulders, a refractory compound that composed nearly all the cuts on the line. Five hundred men and one hundred horses were also at work in the cut on the day the photograph was taken.

Fig. 8 shows the Tidnish dock, the coffer-dam surrounding it, with the harbor moles and Baie Verte in the background. The dredging outfit is also seen in the centre. The trestle on the right carries the building traveler, a similar one to which is being constructed on the left, and the various derricks about are for sorting and storing materials, while on the left the engine house is building. The open seaway in the background on the right is Northumberland Strait. On clear days Prince Edward Island is visible, about 25 miles distant. The foundations of this dock are on red sandstone of excellent quality. The flat ground in front of the coffer-dam is the original sea bottom, all of which is to be removed for the entrance channel. The ends of the lifting dock will be connected with the moles by rock embankments, resting on the solid rock sides of the channel, before the coffer-dam is removed. The lifting dock proper is similar in all respects to the one described at the Amherst terminus, being designed to raise a ship of 1,000 tons capacity. This dock requires no locked basin as at the other end, because the range of the tides seldom exceeds 7 ft., and the channel is navigable at all times.

The moles are of round timber cribs to the level of low

water, above which they are of hewn spruce. They are divided into 10-ft. square weighting chambers by longitudinal and transverse bulkheads, and are filled with rock carried on a ballast floor, resting on the first course of transverse timbers. After the filling is completed mooring posts and decks are added. The moles are surrounded by 12 x 12 square piles, driven close against the sides and flush with the top, and are heavily rip-rapped on the outsides, so they may be considered model constructions of their kind.

The basin is being dredged to a depth of 20 ft. at low water. The dredged channel will be one-third of a mile long, a considerable part of which is already excavated. There will be very little if any subsequent silting, as the bottom of Baie Verte is flat and of compact clay, while its waters are as free from suspended matter as a mountain lake.

Now, having followed the line from end to end, it would be ungracious to close without some reference to the one who has brought the theory of ship railways to a practical application. Mr. H. G. C. Ketchum, the resident Chief Engineer, who is now associated with Sir John Fowler and Sir Benjamin Baker as engineers of this work, had his attention called over 20 years ago to the project of a ship canal at Chignecto. He soon became satisfied that the high Fundy tides and the nature of things generally were against a canal, so he brought forward the plans of the present work. To realize that ships may be transported overland, one must examine the engineering questions involved with a mind trained to such things, so, though among professional men great confidence was felt, popular opinion was much divided and encouragement and financial support came so slowly that one must only wonder why the struggle was not abandoned years ago.

Now the time will soon be at hand when experience will settle all questions with the irresistible logic of facts, and when, as Mr. Ketchum says, "All fears of the practicability of the ship railway and of injury to vessels will disappear as if by magic at the transport of the first loaded vessel from gulf to bay."

JOHN F. O'ROURKE.

AMHERST, N. S., Oct. 15, 1890.

Mr. O'Rourke, who has written the above account of this most interesting enterprise, and who furnished the photographs from which the engravings were made, is the Engineer for the contractors, Messrs. Dawson, Symmes & Usher. Since the pictures were taken the walls of the lifting dock shown in fig. 2 have been carried up some 15 ft. higher; and the right-hand wall of the Tidnish dock, fig. 8, has been built up some 12 ft., and the building traveler on the left is completed, and that wall is being rapidly carried up. The track is laid from the Amherst dock about half way across the isthmus. In addition to the information which Mr. O'Rourke has

given, we publish a map showing the geography of the position and a plan of the location. A profile would have no special interest unless it were reproduced on a large scale. The maximum grades are two-tenths of one per cent., or 10.56 feet per mile. There are eight of these grades, aggregating 335 stations out of the 900 of the line. There is also a bit of grade of one-tenth of one per cent.; otherwise the line is level.

It is proposed to handle ships of 1,000 tons burden, and the probable rates will be 12½ cents a ton on the gross register of the vessel and the cargo will be charged at rates which will be found commercially advantageous. This will probably not exceed the usual cost of transportation by canal, including towage. A minimum estimate of the traffic to be secured is about 800,000 tons, which would yield a gross revenue of \$500,000 per annum. This is no doubt a very low estimate, as the railroad will open up the coasting trade to an entirely different class of vessels from those which now go outside. The estimated cost of operation, including general expenses, is \$150,000 per annum.

## Bayley's Brake Beam Forging Machine.

The ingenious forging machine shown in the illustrations was designed and patented by Mr. R. W. Bayley, of the Westinghouse Air Brake Company, for the manufacture of the Westinghouse brake beam. This machine is the result of much research on the subject of hydraulic forging, Mr. Bayley having made a thorough investigation of the methods employed in the plants which do hydraulic forging in this country.

Figs. 1, 2 and 3 show side elevation, end elevation and plan of the forming machine which shapes the blank previous to welding. The two members of the beam, namely, the tension member A and the compression member B, are placed in the machine with the strut C in proper position, as shown in fig. 3. The strut is first placed, as shown, then the compression and tension members are brought to a red heat and thrust through the openings of the strut, then steam is admitted to the steam cylinder D and the die E is forced up to the stationary die F, thus shaping the beam to the form for welding.

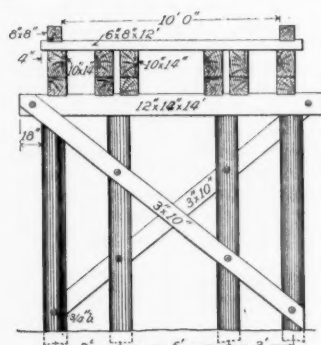
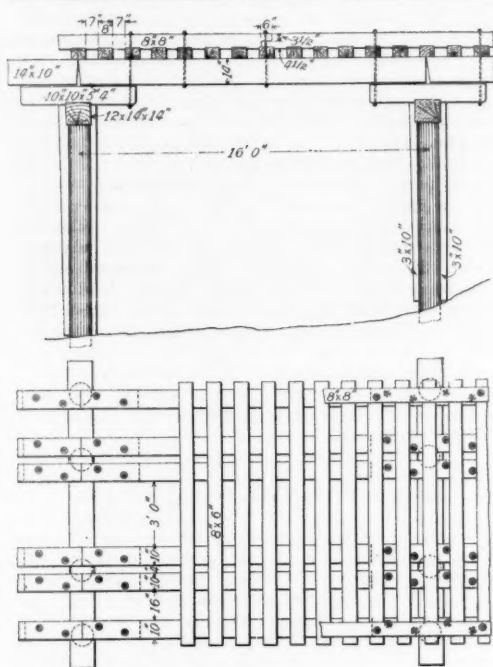
Before welding a dutchman is introduced between the members for the purpose of giving sufficient stock for the fillet at the end of the beam, and also to make sufficient material from which to form the brake shoe journals. This is especially necessary with the beam for freight service, because a lighter iron is used for the members with that beam than with that for passenger service. The fillet pieces, or dutchmen, are rolled in long bars with the proper section and sawed off as required. The machine here shown is adapted for the Westinghouse beam with a round shoe bearing. Other dies would be used for the beam, which is adapted for the Christie head.

Figs. 4, 5 and 6 show the forging machine in side and end elevations and plan. The power is derived by the use of toggle joints shown at G and K in figs. 4, 5 and 6. This is operated by a steam cylinder placed below the toggles at H and J. The toggle G drives the die L which forms the fillet at the end of the beam, while the toggle K forces up the die M which forms the brake shoe bearing.

The form of these dies and their operation have been the subject of much study by Mr. Bayley, and they have a peculiar contour adapted to do the work with the least waste of material and in such a way as to require the least amount of subsequent manipulation of the beam. The exact purpose of this peculiar confirmation of die requires further consideration than that which we can now give it, but we soon expect to show some interesting diagrams made by the inventor during his study on the best arrangement for driving the dies, which will illustrate the power of the toggle joint. With these will be given a consideration of the shape of the dies.

The general operation of the machine is simple, and will be easily understood from the illustration. In the diagrams of the die movement and the power of the toggles we shall show the enormous force available with this construction. It is based on the use of 100 lbs. steam pressure, and the whole machine is adapted for use in an isolated plant, where a considerable additional expense would be necessitated if hydraulic power pressure were used. However, the machine is arranged in such a way that hydraulic cylinders can be placed where the steam cylinders now are without any other change in the machine.

This machine has been designed with a good factor of safety to meet the strains which will be imposed upon it in compressing iron at a welding heat. It will weigh, when finished, about 20,000 lbs. It is nearly completed, and as the constructors proceed with it they are more confident than ever of its adaptability for the work for which it will be used in the shops of the National Hollow Brake Beam Company, of Chicago. These shops we have previously described as being newly constructed and well arranged for the manufacture of brake beams. The location of the forging machine and the furnaces have already been decided upon, and that company will soon add to its output of hollow beams a large number of the Westinghouse beams of various sizes. We have previously given the results of the tests of both of these beams at Altoona.



Wooden Trestle Bridges.\*

BY WOLCOTT C. FOSTER.

## STANDARD PILE TREESTLE, CHICAGO &amp; NORTHWESTERN RAILWAY.

The accompanying cut shows a trestle having many novel points in its construction. It is the standard on the Chicago & Northwestern Railway when short stringers are used. With double-length stringers the bolster or corbel is omitted. Mr. John E. Blunt, the Chief Engineer of the road, informs me that the long stringers cost nearly twice as much per 1,000 ft. B. M. as the short ones, and give one to two years more service. The total cost of the trestle is between \$5 and \$6 per lineal foot.

The guard rails are of a generous size, being of 8-in. x 8-in. timber, and are well secured by  $\frac{3}{4}$ -in. bolts passing through ties and jack stringers. The ties are of good dimensions and well spaced. They are not notched down over the stringers, as is the usual practice.

It is in the stringer details that the novelty of the trestle exists. The ends of the stringer pieces of both jack and track stringers are beveled, so that while they touch at the upper edge they are 2 in. apart at the lower. In the track stringers the pieces are separated 4 in. from each other by cast-iron separators or spools of the form shown in the detail drawing. The stringers do not rest directly upon the corbels, but are separated from them by a flat cast-iron separator, of which an enlarged sketch is given. Only the corbels supporting the jack stringers are fastened to the caps. In fact, these are not fastened to the caps, but merely held in place laterally by lugs of 2-in. x  $\frac{3}{4}$ -in. angle iron 4 in. long spiked to the caps by two  $\frac{1}{2}$ -in. x 5-in. boat spikes.

The caps are 12 in. x 14 in. x 14 ft., placed with the broadest face lying on the piles and anchored to the latter by 1-in. x 21-in. dowels.

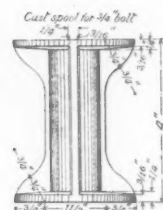
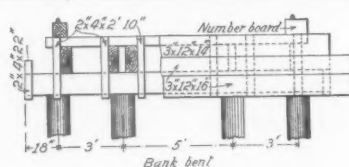
In relation to the bank bent there is very little to say as the drawing sufficiently explains it.

Following are given bills of material for bridges of one, two and a greater number of spans:

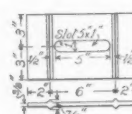
## BILL OF MATERIAL FOR ONE SPAN BRIDGE.

Name.	No. of pieces.	Size.
<b>Floor System.</b>		
Guard rail.....	2	8 in. x 8 in. x 16 ft.
Ties.....	14	6 in. x 8 in. x 12 ft.
Track stringers.....	4	10 in. x 14 in. x 16 ft.
Jack stringers.....	2	10 in. x 14 in. x 16 ft.
Strips (bank ends).....	12	2 in. x 4 in. x 22 in.
Bank planks.....	4	3 in. x 10 in. x 16 ft.
Bank planks.....	2	3 in. x 12 in. x 14 ft.
Bank planks.....	2	3 in. x 12 in. x 16 ft.
Number boards.....	2	8 in. x 12 in. x 1 $\frac{1}{2}$ in.
<b>Bents.</b>		
Piles.....	8	12 in. diameter.
Caps.....	2	12 in. x 14 in. x 14 ft.

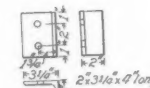
\*Copyright 1890, by W. C. Foster, and condensed from his forthcoming book upon the same subject.



Cast Iron Spool.



Corbel-Stringer Separator.



Angle Lug.

## STANDARD PILE TREESTLE—CHICAGO &amp; NORTHWESTERN RAILWAY.

## BILL OF IRON FOR ONE SPAN BRIDGE.

Name.	No. of pieces.	Size.	Use.
Bolts.....	8	$\frac{3}{4}$ in. x 2 ft. 3 in.	Packing bolts.
Bolts.....	8	$\frac{3}{4}$ in. x 2 ft. 5 $\frac{1}{4}$ in.	Guard rails.
Dowels.....	8	1 in. x 21 in.	Caps to piles.
Angle iron lugs.....	4	2 in. x $\frac{3}{4}$ in. L x 4 in. long.	Hold jack stringers in place.
Spools (cast).....	8	3 in. x 4 in.	Separate stringer pieces.
Washers (cast).....	32		Under bolt heads and nuts.
Spikes.....	8 lbs.	30d.	

## ADD FOR TWO SPAN BRIDGE—LUMBER.

Name.	Material.	No. of pieces.	Size.
<b>Floor system.</b>			
Guard rails.....	4 (altogether)	8 in. x 8 in. x 9 ft.	
Ties.....	W.O. 13	6 in. x 8 in. x 12 ft.	
Track stringers.....	4	10 in. x 14 in. x 16 ft.	
Jack stringers.....	2	10 in. x 14 in. x 16 ft.	
Corbels.....	6 (total 18)	10 in. x 10 in. x 5 ft. 4 in.	
<b>Bent.</b>			
Piles.....	4	12 in. diam.	
Caps.....	1	12 in. x 14 in. x 14 ft.	
Sway bracing.....	2	3 in. x 10 in.	

## IRON.

Name.	No. of pieces.	Size.
Dowels.....	4	1 in. x 21 in.
Bolts.....	28	$\frac{3}{4}$ in. x 2 ft. 3 in.
Bolts.....	4	$\frac{3}{4}$ in. x 2 ft. 5 $\frac{1}{4}$ in.
Bolts.....	4	$\frac{3}{4}$ in. x 4 ft. 2 in.
Bolts.....	8	$\frac{3}{4}$ in. x 19 $\frac{1}{4}$ in.
Angle iron lugs.....	2	2 in. x $\frac{3}{4}$ in. L x 4 in. long.
Cast washers (for bolts).....	88	
Spools.....	8	3 in. x 4 in.
Cast separators (corbel-stringer).....	24	6 in. x 10 in.
Boat spikes.....	6	5-16 in. x 5 in.

## ADD FOR EACH SUCCESSIVE SPAN—LUMBER.

Name.	No. of Pieces.	Size.
<b>Floor System.</b>		
Guard rails.....	2	8 in. x 8 in. x 16 ft. for every odd span.
Guard rails.....	2	8 in. x 8 in. x 18 ft. for every even span.
Ties.....	12	6 in. x 8 in. x 12 ft.
Track stringers.....	4	10 in. x 14 in. x 16 ft.
Jack stringers.....	2	10 in. x 14 in. x 16 ft.
Corbels.....	6	10 in. x 10 in. x 5 ft. 4 in.
<b>Bent.</b>		
Piles.....	4	12 in. diam.
Caps.....	1	12 in. x 14 in. x 14 ft.
Sway bracing.....	2	3 in. x 10 in.

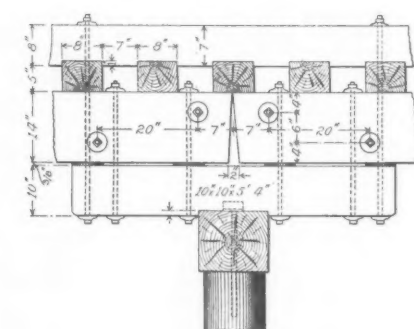
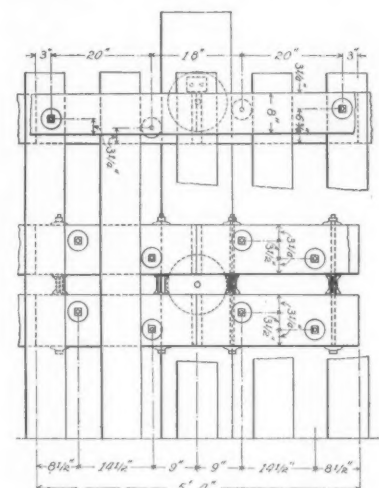
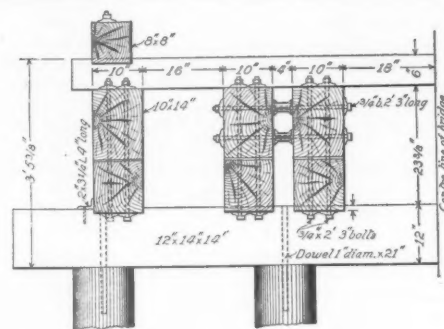
## IRON.

Name.	No. of Pieces.	Size.
Dowels.....	4	1 in. x 21 in.
Bolts.....	28	$\frac{3}{4}$ in. x 2 ft. 3 in.
Bolts.....	4	$\frac{3}{4}$ in. x 2 ft. 5 $\frac{1}{4}$ in.
Bolts.....	4	$\frac{3}{4}$ in. x 4 ft. 2 in.
Bolts.....	8	$\frac{3}{4}$ in. x 19 $\frac{1}{4}$ in.
Angle iron lugs.....	2	2 in. x $\frac{3}{4}$ in. L x 4 in. long.
Cast washers (for bolts).....	88	
Spools.....	8	3 in. x 4 in.
Cast separators (corbel-stringer).....	24	6 in. x 10 in.
Boat spikes.....	6	5-16 in. x 5 in.

## The Quincy Accident.

The report of the Massachusetts Board of Railroad Commissioners on the Quincy accident has been made public. The particulars of this terrible disaster are already pretty well known, but it may be well to recite them briefly.

On Aug. 19, 1890, a passenger train on the Old Colony Railroad was derailed near Quincy station. Twenty-three people were killed instantly or died later of their injuries, while 30 have been reported as more or less seriously injured. The train consisted of a locomotive and nine cars and carried 301 passengers. It was derailed by striking a track jack which was in use by a gang of trackmen who were surfacing. The view was obstructed so that the engineer of the approaching passenger train did not see the men at work until he got within about 350 ft. He was within 100 or 150 ft. of the jack before the men had got off the track so that he could see that the jack remained fixed. He was going at a speed which he estimated at 25 miles



Details of Stringer Joint.

per hour, with steam shut off, on a down grade of 30 ft. per mile. The Commissioners are not satisfied that this estimate of the speed is correct, but do not give any estimate of what it was. When the engineman saw the obstruction he applied the train brake. His engine was fitted with a driver brake operated by a separate handle, but this was probably not applied, and he does not recollect having reversed his engine. The engine was derailed 30 ft. beyond the jack, and ran 250 ft. further before it turned over. The tender ran 200 ft. beyond the engine, and three cars also passed the engine, one of them, the baggage car, running even further than the tender. No one in either of these three cars was seriously injured. The fourth car in the train, a coach, loaded with 70 passengers, was seriously wrecked by striking the rear end of the engine, and it was in this coach that the fatalities all occurred, partly from the wreckage and partly from scalding.

There was no flag out to protect the section gang, and a gravel train which happened to be passing in the opposite direction at the same time prevented the men hearing the approach of the express train. The Commissioners have investigated carefully the rules and practice of the Old Colony. They find that it has a standing rule to put out a flag in case any repairs are being made "which will interfere with the safe passage of a train," but that in the practice of the road it is not considered that surfacing, including the raising of low joints, provided the rails are safe, interferes with the safe passage of a train. The Board addressed a circular letter to the railroads of Massachusetts inquiring into their rules and practice in relation to track repairs. The summary of the answers is that no serious accident from the use of a jack or lever for raising track has ever before happened in Massachusetts. None of the nine companies replying has any printed rules especially relating to the use of a track jack. One manager has, since this accident, ordered that a track jack, if used, must be placed on the outside of the rail. The conclusion of the Board is that among the Massachusetts railroads the use of a jack is not considered as an obstruction requiring the use of a flag. The Board addressed a similar circular letter to various railroads in other states, and received answers from 11 important lines. None of these have any printed rules especially relating to the use of a track jack, and from their responses it

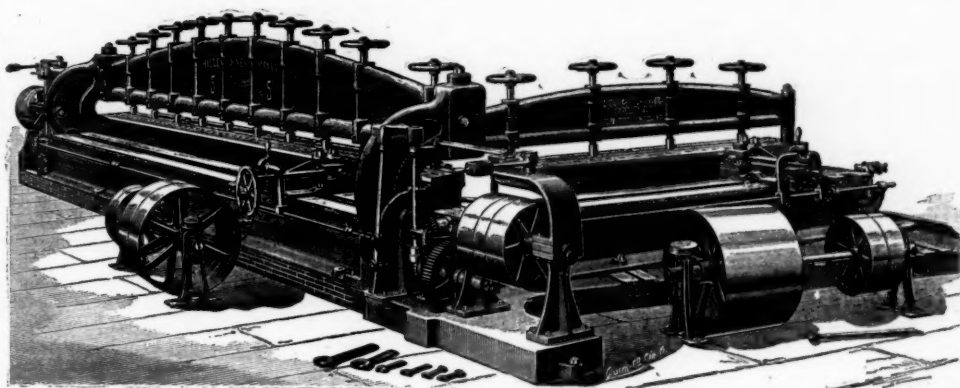


appears that the use of a track jack is not considered as an obstruction requiring flagging.

The Board considers that the immediate responsibility for this accident rests upon the section master, whose fault was not the disobedience of a rule but failure to realize the peculiar danger of his position. The curve, at the end of which he was working, prevented his seeing more than 540 ft., and his "inexcusable neglect was his failure to keep an outlook that would insure his seeing the train the instant it came in sight." He did not see it until it had advanced 180 ft. beyond the point where he might have seen it.

The Board considers that in the light of this accident it is clear that some definite and stringent regulations must be adopted for the use of a track jack. It is not considered sufficient or even good practice to use a jack on the outside of a rail. One great reason is that on a double track road the complication and danger would be greater than if it were placed on the inside of the rail. The conclusions are, therefore, that "a track jack should not be used either on the inside or the outside of the rail, nor should a lever or other cumbersome instrument be used between the rails, unless such tool is protected as is required when the track is obstructed." In other words, we suppose that the recommendation is that a track jack should never be used without flagging. Another recommendation is that when any repairs are being made, even work which does not interfere with the safe passage of trains, the track should be clear of men and tools before an approaching train gets within a quarter of a mile of the point where the work is being done.

These are, in brief, the results of the inquiry so far as they bear directly upon the immediate cause of this accident. The Board takes occasion, however, to say something on the subject of brake power. The cars ran about 540 ft. after the jack was struck, or at least 640 ft. after brakes were applied, in spite of the fact that the engine ran 250 ft. on the ties, and that the tender and five cars also ran a part of this distance on the ties. In the words of the report, "it is an impressive consideration that, if the train had been brought to a standstill when the front end of car No. 263 (the car in which the fatalities occurred) reached the engine, and if the other cars had taken the course which they did take, or, in other words, had the train not gone the last 45 ft., none of the passengers would have been killed or even seriously injured." This, then, is considered "a proper time to enforce the repeated recommendations made to railroad companies to spare no expense in equipping their cars and engines with the best and fullest brake power." Brakes should be applied to every wheel in the train except the engine trucks, and the leverages should be readjusted from time to time so as to secure the greatest practicable effi-



No. 5 DUPLEX PLATE PLANER.

By HILLES & JONES COMPANY, Wilmington, Del.

below the performance to be expected of a perfect brake. He points out which of these defects are immediately remediable—that is, by the application of brakes to the driving wheels of the engine and to all the wheels of six-wheeled trucks, by the use of the quick-acting valve and by varying the brake shoe pressure during the stop, according to the brake shoe friction. He says the use of driver brakes and of brakes on every wheel of passenger cars should be insisted upon, and that there is no excuse for their omission. "The driver brake should go on with the same lever that applies the train brake."

"The introduction of the new quick-acting brake should be pushed. The introduction of some device for varying the brake shoe pressure during the stop is probably only a matter of time. It would increase considerably the efficiency of the brake, especially at high speeds, and would probably add little to the expense and complication. The proportioning of the brake pressure to the load is less important with passenger cars than with freight cars, because the proportion of live load is less, and it will probably be some time before any device for this purpose is introduced."

Prof. Swain says further it is very probable that the brake power is frequently not over one-half of what it should be, notwithstanding the fact that trains composed of parlor and sleeping cars are precisely those which should have the greatest braking power, since they are run at the highest speeds. Altogether Mr. Swain's special report is a document of immediate practical interest, although it contains a great deal of history which has little bearing on the matter in hand.

pinions being of wrought iron with ample strength and wearing surface. When desired, the main clamping beam is made to raise and lower from one end. The saddle of the end planer is so arranged that by a change, which is made in half a minute, the plate can be slipped entirely through, so that any length of plate may be planed on the side planer, if desired, by successive settings. There is an automatic attachment which prevents the two saddles coming into collision at the corner of the plate. The weight of this machine is 48,500 lbs.

#### Locomotive Side Rods.

At the November meeting of the Northwestern Railroad Club the discussion on the above subject was opened by Mr. H. Higgins, who said, in part:

In considering the best form of side rods for locomotives there are a number of points to be considered and conditions to be met and overcome, making it more difficult to design a side rod than a main rod. A side rod must meet the following conditions: It must be strong enough to resist the alternate thrust and pull, to which it is subjected in transmitting power from one wheel to another, without bending or buckling vertically, and must only allow a slight amount of spring, or buckle, horizontally under the heaviest work. And yet it should be as light as possible to do all this without creating stress, due to the centrifugal force developed when running at high speed.

There have been a number of different forms of side rods tried in the past. Modern practice has reduced the number to three distinct classes of rods. The most common and popular of these classes has a uniform rectangular transverse section throughout. The metal is distributed so that generally the depth is from two to two and one-half times the thickness. Taking the ordinary 17x24-in. eight-wheel engine as a type, there are usually from seven to eight square inches of cross sectional area in the side rods. This form of rod has had a long and useful career; but it will readily be seen that the distribution of metal is not such as to meet the required service, with the smallest amount of metal.

A much stronger rod can be made by increasing the depth and reducing the thickness at the centre with the same weight of metal. This form of rod, which is commonly called the "fishback," is much stronger to resist centrifugal force, and at the same time is more flexible sideways than one of uniform section, with the same weight of metal. It is considered by many to be the best form of side rod, as it combines the best features of the others. Probably the reason why it is not more generally adopted is, that it is more expensive to make than the straight rod.

The third form is that having an I-section. All of these that I have seen so far have a uniform section throughout; but I have read that some are in use that are made deeper in the centre than at the ends. Rods of this form are very strong and rigid, in comparison to their weight, and with some are quite popular. Others object to them as not being sufficiently flexible sideways.

There are also three classes of side rod ends—First, those with strap bolts and keys; second, the solid strap with adjustable braces and keys, and, third, the solid end with brass or bronze bushings. I will not take time to go over these very fully but will simply touch upon each.

The first class—those with straps, bolts and keys—have served the purpose for a long time and have done excellent service; but there are disadvantages in their use. A good deal of the sectional strength is taken up by bolts and keys. This loss has to be made up in the thickness of the strap to insure the required strength. The result is that they are very heavy. Then the number and costliness of the parts make repairs and renewals an important item. There is also an opportunity for careless or unskillful keying, which may result in sheared bolts or bent or broken rods and crank pins.

The next class—those with solid straps with keys and adjustable braces—is one step in the direction of lighter rod ends. The heavy stub and the bolts are dispensed with, and the strap may be narrower. There is, however, a serious objection to this class; and that is that the vertical flange of the brass can only be left on one side of the strap. In consequence of this the braces soon get out of square and become loose in the strap.

The third class—the solid end side rod—is still somewhat in the experimental stage. These rods are being successfully run on some roads. They have some excellent features. The fact that there are no bolts or keys to get loose or lost is a good thing, and the rod end can be made amply strong without being very heavy. There seems to be good reason to hope that this class of rods may come into more general use.

Mr. REED: The time for experimenting in my opinion is, or ought to be, about over. The time has arrived when making straps and bolts and lugs should be a thing of the past. In the shops now we have no time for unnecessary work. I am in favor of a fish-back rod with solid ends. I have had good success with them here, and also on roads with which I was connected in

#### Brake Equipment of Massachusetts Railroads.

	B. & A.	B. & M.	B. & R. & L.	Cheshire.	Conn. R. R.	Fitchburg.	N. Y. & N. H. & H.	N. L. N.	N. Y. & N. E.	O. C.	N. Y., P. & B.	Totals.
Number of passenger engines.....	81	244	12	7	15	93	108	11	74	138	23	806
with driver brakes.....	26	3	0	1	6	6	52	0	74	53	4	225
with driver and train brakes operated by one handle.....	20	3	0	0	0	0	49	0	51	29	0	152
Number of freight engines.....	129	112	0	27	18	64	66	11	77	49	20	573
with driver brakes.....	85	0	0	0	0	0	10	0	52	3	0	85
with driver and train brakes operated by one handle.....	20	0	0	0	0	0	0	0	0	0	0	20
Number of passenger cars.....	326	819	54	28	64	2	583	25	260	588	71	3,030
with train brake.....	326	819	54	28	64	212	583	25	260	588	71	3,030
with quick-acting brake.....	244	0	0	0	12	0	87	0	60	91	10	504
Number of freight cars.....	6,353	8,370	6	493	552	5,569	3,885	316	4,522	3,173	1,844	35,083
with train brake.....	151	0	0	0	0	1,169	128	0	64	188	4	1,704
with quick-acting brake.....	145	0	0	0	0	600	100	0	63	157	4	1,069
Number of cars with six-wheeled trucks.....	15	10	0	0	13	27	17	0	0	24	0	106
Number of cars with quick-acting brake.....	6	0	0	0	0	0	0	0	0	11	0	22
Number of cars with brakes on all wheels.....	6	0	0	0	0	0	0	0	0	0	0	6

NOTE.—The Housatonic has failed to respond.

iciency; and the driver and the train brake should be operated by the same handle. In this case the weight on the drivers was not far from 50,000 lbs., and the total weight of the train about 600,000 lbs., so that a loss of eight per cent. of the available brake power resulted from the failure to apply the driver brake. On the six-wheel truck of the Pullman car only four wheels were braked, so that a material percentage of the train weight was unbraked from this cause. Further, only three cars in the train out of the nine were fitted with the quick-acting brake. It is considered probable, therefore, that if the brake equipment of this train had been up to the latest well-known standards no lives would have been lost in this accident.

For the purpose of the investigation of this phase of the accident the Board procured a report from the railroads of the state as to their brake equipment. This is condensed in the table which is annexed. The Board also procured a special report from its engineer, Prof. George F. Swain, on the general subject of brakes and their possible efficiency. In this report Professor Swain has collected the results of a good many tests, showing stops that have been actually made, going over the subject from the era of hand brakes and including the latest recorded results of the Westinghouse experimental train. He compares these results with what could be obtained by a perfect brake, and shows the theoretical and practical reasons why the brakes in common use fall

#### Improved Duplex Plate Planer.

The engraving shows an improved duplex plate planer by the Hilles & Jones Co., which will plane the side of a plate 20 ft. in length, at the same time planing the end of the same plate 8 ft. in width. The end planing arrangement is novel. This consists of a foundation plate of a fan shape, which carries a radial bed. Upon this bed is the necessary saddle, etc., for carrying the tools. The bed has a radial motion of ten degrees each side of the centre line, so that the end of a plate can be planed at an angle of ten degrees either way with the side, allowing taper sheets to be worked as well as rectangular ones.

The shifting of the belts and the tools is done automatically in both cases, although the operator can control both of them when standing in the position for running the machine.

The short clamping beam for the end planer is attached to the beam of the side planer, so that it has a corresponding radial motion with the bed. The main driving screws in these machines are 4½ in. in diameter, of steel, and are ample for the heaviest work, being supported their entire length. There is a rack on the fan-shaped bed which moves the end planing attachment to the position required. Both ends are entirely independent and can be used separately if desired, each one having a countershaft for driving. The spur gears are cut, the



the old country, and this form of rod comes, I believe, from there. I am also in favor of a solid end for the front end of main rods. There can be no shortening and lengthening of them. Engineers are constantly wanting to change lengths, but we know that there is only one length for a rod. By the adjustment of the old style of rod many pins and rods have been broken. We do not use an adjustable brass, but a solid one and a plain cylindrical bushing without flanges. I do not think steel is a good material for side rods. With so much vibration you need something softer than steel. I prefer the fish-back rod to any other; it is cheaper than the fluted rod and answers all purposes.

The further discussion did not bring out anything new as to the section of rod, but was confined mostly to the question of solid ends. At the conclusion a vote was taken on the resolution that, "In the opinion of this club, the solid end is preferable to the strap rod." Carried, 11 to 0. Other members did not vote.

#### Hauling Capacities of Freight Locomotives.

Some time ago a correspondent requested us to give him some information concerning the hauling capacity of a locomotive on a level 10-deg. curve. In order to give the results from actual experience we sent circulars to many, asking questions in regard to their freight locomotives and their hauling powers under various conditions. From the few replies received we have tabulated the most valuable particulars just as they were furnished to us, and we must leave our correspondent to draw most of his own conclusions.

It may be interesting to examine the hauling capac-

draught will be 21 ft. 6 in., and the displacement 6,682 tons; the estimated speed of the vessel is 17 knots.

The engines are triple-expansion of the inverted vertical type, with cylinders of 35½, 57 and 88 in. diameter and 36-in. stroke. The total indicated horse power of the engines will be at 132 revolutions and with 130 lbs. initial pressure of steam some 9,000 horse power. The boilers are of the horizontal return tubular type, 10 ft. in diameter and 14 ft. 8 in. in length, and are to carry a steam pressure of 135 lbs. to the square inch. The heating surface of all the boilers will amount to about 18,825 sq. ft. and the grate surface 553 sq. ft. There are twin screws, each being 15 ft. in diameter and having three blades.

The side-belt armor, extending some 180 ft. along the more exposed sides of the vessel, is to be of the latest nickel steel, 12 in. thick; it will alone weigh some 550 tons. The turrets for the 10-in. guns are to have an armor of nickel steel 8½ in. thick, with a weight of 145 tons. The barbettes will have armor 12 in. thick. The balance of the armor will run from 4 to 10 in. in thickness.

The armament will consist of four 10-in. breech-loading rifles mounted on barbette; six 6-in. breech-loading rifles, protected by segmental shields 2 in. thick; four 6-pounder, eight 3-pounder and two 1-pounder rapid-firing guns; four revolving cannon of 1.4-in. bore, four Gatling guns and seven torpedo tubes. The 10-in. guns have been considered more satisfactory than those of larger bore; they are lighter weight, and hence require

Another defect in the swing-motion truck, when constructed with channel bars for cross section, and upon which the bolster or swing-beam hangs, is that the bar is too light. While it may be strong enough to sustain the weight of the load under ordinary conditions, the concussion of the car in stopping and starting the train bends the bar out so much that this becomes a great source of danger. From my observation of these trucks, as they are generally built, I do not think they are suitable for the service required of them as compared with the rigid truck. At the same time, I believe that the swing-motion truck, if well built, and all the weak parts strengthened and guarded against breaking down, will carry the load easier than a rigid truck.

So far as the wearing of the flanges is concerned, I do not think the form or kind of truck enters into the question so much as whether the truck will curve easily under the load. To secure this it is very necessary that the bearing should be largely in the centre, or that there should be some device to reduce the friction between body and truck, so as to allow the truck to curve on the smallest pressure against the flange of the wheel. This, of course, will add to the expense of building the truck, but, as I have often said before, you cannot build a good car-body or a good truck without expending considerable money.

Mr. MARDEN (Fitchburg): I have not made up my mind which is the best truck. I have always thought the swing-motion truck was better for the track, the car and the load than the rigid truck. The objections that Mr. Adams brings against it are valid, and should be remedied. In striking a curve from a straight line, the natural tendency of the car is to throw itself strongly toward the long side of the curve; and I have always thought it desirable to ease that sudden shock by a swing-motion device. There is another objection to the majority of swing-motion trucks as at present

ACTUAL HAULING CAPACITIES OF FREIGHT LOCOMOTIVES.

NAME OF ROAD.	Weight of locomotive in working order.	Weight on driving wheels.	Weight of tender half loaded.	Steam pressure.	Diam. cylinders.	Stroke of pistons.	Diam. driving wheels.	No. pairs of driving wheels.	Hauling capacity and speed on level tangent. Tons of 2,000 lbs.	Hauling capacity and speed on level 10° curve.	Hauling capacity and speed on 10° curve and grade stated.	Hauling capacity and speed on 10° curve and grade stated.	Equiv. number of 8-wheel cars.	Usual length of train.	Compensation per degree of curvature per 100 ft.
C., R. I. & P.	98,900 lbs.	65,300 lbs.	52,000 lbs.	140 lbs.	18 in.	24 in.	63 in.	Two.	1,155 tons, 22 miles per hr. (a)	1,056 tons, 22 miles per hr. (b)	792 tons, 15 miles per hour, up 30 ft. grade (c)	700 tons, 12 miles per hour, 1½ grade, 3° curve at top (d)	(a) 35 cars. (b) 35 cars. (c) 21 cars. (d) 10 cars.	(a) 1,293 ft. (b) 1,282 ft. (c) 887 ft. (d) 4,000 ft.	
C., St. P. & K. C.	98,006 lbs.	82,000 lbs.	51,480 lbs.	160 lbs.	18 in.	24 in.	55 in.	Three.	2,500 tons, 15 miles per hr. (a)	1,250 tons, 20 m. per hr. (b), c, v	1,250 tons, 18 miles per hour, 1½ g'de, ½ mile long (c)	700 tons, 12 miles per hour, 1½ grade, 3° curve at top (d)	(a) 100 cars. (b) 50 cars. (c) 50 cars. (d) 24 cars.	(a) 2,000 ft. (b) 2,000 ft. (c) 2,000 ft. (d) 1,000 ft.	
E. T., Va. & Ga.	120,000 lbs.	106,000 lbs.	60,000 lbs.	145 lbs.	20 in.	24 in.	50 in.	Four.	2,250 tons, 12 miles per hr. (a)			650 tons, 12 miles per hour, 63 ft. grade, 8° curves.	10 cars.	360 ft.	
Del., L. & W.	115,000 lbs.	100,000 lbs.	45,000 lbs.	140 lbs.	19 in.	24 in.	57½ in.	Three.				235 tons, 12 miles per hour, 75 ft. grade, 5° curves.			
Cal. Southern.	126,000 lbs.	96,000 lbs.	50,000 lbs.	160 lbs.	19 in.	28 in.	54 in.	Three.			296 tons, 8 miles per hour, 3½ grade, curve 850 ft. long (c); 122 tons, 8 miles per hour, 2½ grade, curve 1,020 ft. and 800 ft. long, 10° and 12° curves (c).	579 tons, 10 miles per hour, 1½ grade, 7° curve, 490 ft. long (d); 957 tons, 12 miles per hour, 1½ grade, 6° curves, 800 ft. long (d).	(c) 9 cars. (c) 13 cars. (d) 18 cars. (d) 30 cars.	(c) 390 ft. (c) 526 ft. (d) 696 ft. (d) 1,104 ft.	1.2° gr., 0.05 ft. 1.6° " 0.04 ft. 2.2° " " 3.0° " " "
Phila. & Read.	116,850 lbs.	101,470 lbs.	45,650 lbs.	140 lbs.	20 in.	24 in.	50½ in.	Four.	3,053 tons just moving (a).	1,887 tons, 10 miles per hr. (b)	783 tons, 10 miles per hour, 20 ft. grade (c).	2,474 tons, 5 miles per hour, 15.28 ft. grade, tangent track (d); 2,474 tons, 10 miles per hour, 14.22 ft. grade, tangent track (d); 2,474 tons, 5 miles per hour, 5.28 ft. grade, 4° 15' curve (d).	(a) 82½ cars. (b) 51 cars. (c) 21 cars. (d) (d) 63.	(a) 3,094 ft. (b) 1,912 ft. (c) 757 ft. (d) (d) 2,576 ft.	

ities on level straight tracks, as more is known about such resistances than those on curves.

We will assume the usual resistance of a freight train at 7 lbs. per ton and the pulling power at ¼ and ½ of the weight on the drivers. Then these quantities, for the locomotives specified in the large table, may be deduced and tabulated as below:

Name of road.	Resistances. Pounds.	One-fourth weight on drivers. Pounds.	One-fifth weight on drivers. Pounds.
C., R. I. & P.	8,267	16,325	13,060
C., St. P. & K. C.	17,682	20,500	16,400
E. T., Va. & Ga.	15,960	26,500	21,200
Del., L. & W.		25,000	20,000
Cal. Southern.		24,000	19,200
P. & R.	21,332	25,367	20,294

It appears from this that the pulling resistances on a level are nearer ¼ than ½, probably in order to leave sufficient margin for grades and curves. In the case of the Rock Island road the locomotives appear to be underloaded. This may be due to insufficient steaming capacity. No account is taken of the speed of these trains because the Burlington trials showed that the resistances are not sensibly variable within the speed limits given. In the case of the Philadelphia & Reading train, which was "just moving," the resistance was probably exceptional.

#### The Launch of the Maine.

The United States armor-clad cruiser Maine was successfully launched at the Brooklyn Navy Yard at noon on Tuesday, Nov. 18. This is the first launch that has taken place at the Brooklyn yard since that of the unfortunate Trenton in 1876, and the Maine is the first of the latest type of iron-clad to be launched in an United States Navy Yard.

Every endeavor has been made to put into the Maine the best material in the strongest and most workmanlike manner that the best possible skill, study and experience can bring together. In the launch there was not the least mishap, and the tens of thousands of visitors went away well satisfied with the sight.

This vessel will have a length over all of 324 ft. 4½ in.; length at the load water line 318 ft. 3 in.; the mean

much lighter means for direct support and recoil. The 10-in. guns are a mean between the light and heavy ordnance, and average better service and protection for the cost. The life of a 10-in. gun is longer than those of larger calibre, the limit in the number of times that a gun can be fired being a strong element in favor of the 10-in. ordnance.

The average penetrating capacity of these 10-in. guns is 20 in. of wrought iron at 3,000 ft. distance.

The "Maine" has been building since the fall of 1888. The first keel plate was laid on Oct. 11, the first rivet was driven on Nov. 2 and the first frame was raised on Dec. 5 of that year, so she has been two years making ready for launching, and will be at least one year making ready for steam. The plates will cause the longest delay in consequence of the changes to nickel steel.

#### Swing-Motion and Rigid Trucks.

At the November meeting of the New England Railroad Club the subject discussed was "The economy and safety of swing-motion trucks as compared with rigid trucks." An abstract of the discussion follows:

Mr. ADAMS (B. & A.): This is a question to which I have not given much attention until quite recently. Our company having always built rigid trucks, it would be quite natural that I should favor that kind of truck; but in looking at the question of comparison as to which is the safest and most economical, the rigid or the swing-motion truck, I have tried to rid myself of all prejudice either for the one or the other. My experience with the swing-motion truck has not led me to believe it to be the best, nor, as it is generally constructed, the safest; and I think if it were built differently it could be much safer. The principal defect that I have noticed in it is in the manner of constructing the hanger that sustains the body of the car. It is usually made with a hole drilled or punched in each end, through which an axle or bar goes, upon which rests the spring plank; and the weight of the whole load is brought upon these four bars, which are usually about an inch and a quarter to an inch and a half in diameter where they go through the hanger; and as the lateral motion of the body is constant, the friction produces very rapid wear upon both the axle and hanger, and the result is that they soon become so worn that they break, and there is consequently a wreck of the train. This defect of construction is a very serious one, and wrecks have been common from this cause.

used, which Mr. Adams has not mentioned. The truck should be so constructed that the weight of the body should check the tendency of the car to throw toward the long side of the curve before it would strike the wheel base or side of the truck. That ought to be confined within at least 2 or 2½ in. A great many of the freight swing-motion trucks allow of 2½ to 3 and 4 in., and so, when on straight hangers, there is nothing apparently to stop them from going over four or five inches, or until they strike the side of the truck. In the discussion of this question before the Western Club, the tendency there seemed to be in favor of the rigid truck, the principal reason given being its economy when compared with the other truck, and that the swing-motion truck necessitated more repairs. That is undoubtedly so when it is constructed in the manner stated by Mr. Adams; but I believe if it were constructed on true mechanical principles, so that the weight of the body should overcome the side-throw of the car within a given distance, and the truck were made substantial, it would be much easier for truck, cars and load. I have put swing-motion trucks under a certain number of fruit cars, and rigid trucks under other fruit cars, and find that the fruit comes through in much better condition in the former than in the latter. I notice that nearly or quite all the fruit cars running east from the Pacific coast are on swing-motion trucks.

The question was asked in the Western Club why rigid trucks were not adopted under passenger cars. I don't think they would give very good satisfaction there, or under any cars running 50 or 60 miles an hour. That is my impression from an experience I had in riding to a wreck in a 34-ft. box car, where we were in a hurry to get there. The car had a rigid truck, and the side motion was such that one had to keep pretty well braced to prevent being thrown over; and I think that would be the case on any car with a rigid truck running at a high rate of speed. If that is so, I don't know why it should not be true, to a degree at least, of cars running at the rate of 15 to 20 miles an hour. At the present time, however, I am putting under a rigid truck, partly as a matter of economy in the first construction, and partly because I am not satisfied with the construction of any swing-motion truck that I yet know of. At the same time, I believe that the mechanical principle involved in the swing-motion truck is best adapted to either freight or passenger service, as far as economy is concerned, if the trucks are properly constructed.

The PRESIDENT: I would like to ask if any one has a rigid truck freight car with steel-tired wheels in use? Mr. ADAMS: We have quite a number with steel wheels under them. We don't put new steel wheels under freight cars, but those discarded from passenger service that we consider sufficiently good for that use. I never observed any material difference in the wear of



the flange in the use of the one truck or the other. When the tires are worn down so thin as to render the wheels unsafe under passenger cars, they can be used a long time under freight cars. We probably have a number of hundreds running that way. I don't think the wearing of the flange enters much into this question of trucks. I don't think the swing or the car, or the tendency of the load to keep in a direct line, instead of following the curve, has very much to do with the wearing of the flange. I think if there were some device to relieve the friction between the body and the truck materially, that would obviate the wear of the flange more than any motion that could be put into a truck. It seems to me that Mr. Jewett's device or something similar would obviate the wear of the flanges almost entirely. The slightest touch upon the flange will move the truck round under the body, and as quick as the truck moves the body must go with it. His device reduces almost to nothing the friction between the body and the truck, so that a very small pressure on the flange moves the truck round on the line of the curve. If this were generally applied to our freight cars we should have much less flange wear. I think the conclusion of the Western Club in favor of the rigid truck was arrived at in consequence of the frequent breaking down of the other truck, and the expense resulting therefrom. I am satisfied that on account of the way in which we construct our swing motions we have increased the life of them more than ten times. Formerly we almost invariably made new axles when we brought a passenger car in or worked it over or bushed the hangers up or made new ones; but now we do not have to do it oftener than once in five or six years. By the use of a different plan from that in general use we have relieved that difficulty almost absolutely. If I were to build swing-motion trucks for freight cars I should adopt a different plan from that now in general use. I have sometimes seen the channel bars so much bent as to pull the bearing of the hanger off or nearly so, bent out two or three inches. That may be remedied by making a heavier channel bar or trussing them so that they will meet the resistance brought against them in sudden concussion or in stopping the train. They are strong enough to hold the load perpendicularly, but not strong enough to hold it laterally.

The President: I have received a letter from Mr. William H. H. Sisum, who has a peculiar truck in use under stock cars in actual service, asking permission to present models and drawings, which he has here, and I have a paper from him which I will ask the Secretary to read.

Without drawings of the truck Mr. Sisum's paper loses much of its interest, and therefore it is withheld for the present. His truck is called the canting lever truck, and he said: "In actual practice it has been found in a trial extending over three years, covering a distance of 165,000 miles, with 42 in. steel-tired Allen paper wheels, that the flanges showed no wear at all, and the end wear of the brasses was only one-sixteenth of one inch, and not one dollar of expense on 50 cars. There is this difference between the swing motion and the canting lever: In the swing motion the movement is on the centre of the truck frame, and has no control over the wheels and axles; while in the canting lever the front pair of wheels operate the rear ones through the centre pin, causing the truck as a whole to become radial, thereby preventing the flanges from cutting. So far there has been no speed obtained where the canting levers have become a disturbing element."

Mr. J. T. GORDON (Concord R. R.): We build nothing but swing-motion trucks now for our cars. I think, however, we have got something better than the hanger which has been described. We make a link for the hanger which is  $1\frac{3}{4}$  of an inch, with the best iron we can buy. The axle under our spring plank is 3 by  $1\frac{1}{2}$  inches, and in my experience of about ten years I have never known of an axle breaking. We put a casting on the top, which takes a good deal of the wear of the axle. I have no doubt a rigid truck can be built cheaper than a swing-motion truck. If I were going to construct a rigid truck I should want a centre bearing somewhat different from most I have seen. I had a train drawn into our yard to-day in order to see how many swing-motion and how many rigid trucks there were in that train of about 43 cars, and found only six with rigid trucks, and the rest with swing-motion—the train being made up of cars from several different roads. We have the channel bar which Mr. Adams referred to, and to my knowledge we never had the trouble which he mentions. I have seen some slightly bent out, I suppose by the shock of starting the trains.

Mr. J. B. FLETCHER (National Dispatch): There are evidently two sides to the question. We well understand that swing beam trucks cost more money, but they are the cheapest in the end if they are properly constructed. All our cars have swing-beam trucks. We have a continuous hanger, which runs round from one end to the other, and have no trouble with it at all. We are satisfied from the reports of shippers and freight handlers that the freight is received in better condition from cars with swing-beam trucks than those with rigid trucks; otherwise we should build rigid trucks, on account of their less cost.

#### American Society of Mechanical Engineers—Richmond Meeting.

The first day's proceedings were reported last week. Just before the adjournment of the morning session on Wednesday, Nov. 12, papers were presented as follows: "Light Cable Road Construction," by Frank Van Vleck, and "Authorities on the Steam Jacket: Facts and Current Opinions," by R. H. Thurston.

The discussion of the latter paper was opened at the evening session by Prof. James E. Denton, who does not support the views held by Prof. Thurston as to the advantages of the steam jacket. He stated that the engines in which Watt found economy in the use of the jacket were no longer used. The Cornish builders introduced the cut-off. The steam in the boiler at 50 lbs. fell to 4 lbs. in the cylinder. The steam in the jacket was 50 deg. above that in the cylinder. There was no cylinder condensation. No such engine was used to-day. Hearn's tests in 1850 showed 23 per cent. economy in the use of the jacket. The error arose from the ratio of expansion, being 14 in the engine without jacket and 9 upon another engine having a jacket. He went to such a short cut-off that he swallowed up the economy of the jacket. The jackets are put on marine engines to warm up the cylinders, not because there

is any economy of fuel. On account of the slow speed of the Leavitt engine, there was undoubtedly some gain by the use of the jacket.

The next paper was also by Prof. R. H. Thurston on "Chimney Draft: Facts and Theories."

"A Novel Form of Flexible Tubing" was the subject of a paper by T. R. Almond. Samples of this tubing previously examined by members had elicited much commendation as a most ingenious application of the well-known flexibility of a spiral metal spring to the formation of an air or steam tight pipe.

Other papers which followed were: "Heat Transmission through Cast Iron Plates Pickled in Nitric Acid," by R. C. Carpenter; "Some Properties of Ammonia," and "Mechanical and Physical Properties of Sulphur Dioxide (SO<sub>2</sub>)," and "Theoretical Investigation of Efficiency of Vapor Engines," by Prof. de Volson Wood; "Experimental Determination of the Latent Heat of Ammonia," by Prof. D. S. Jacobus, and the "Automatic Regulation of Injection Water to Vapor Condensers," by James McBride. Mr. Gwynne considered this invention a very important one for sugar refineries especially, and hoped to see it come into general use.

An extended discussion was started by the following topical question: "Is there any reason why corrosion should be more active in one place rather than another inside a steam drum properly piped to connect several bodies in battery?" Various theories were advanced to account for it, among them, acid or grease in the water, impact, chemical or galvanic action. No satisfactory explanation was, however, given. Adjourned at 11:15 p. m.

The first paper of Thursday was by Louis G. Engel, on a "Hydraulic Hoisting Plant for the Pier of the Brooklyn Sugar Refining Co.," followed by those of Edwin Graves, on "Hydraulic Traveling Crane," and Charles W. Hunt, on "Rope Driving." Abstracts of two of these papers follow.

#### HYDRAULIC TRAVELING CRANES.

Mr. Graves claims to have been the first to have adopted hydraulic power from a fixed location to this class of machinery. It can be adapted to cranes of small or large capacity, and, to illustrate the latter, the author described two cranes now being erected, each having the ability to lift 45 tons with a hoist of 43 ft. The span is 50 ft., and the travel 300 ft. The power is furnished by permanently located rams of special construction. The author said:

"When, as is usually the case, there has to be performed a variety of lifting, both light and heavy, it is desirable both for economy of power and increased speed that rams of smaller diameter be employed for the lighter work, holding in reserve the larger one for the heavy work."

An effective and cheap method of accomplishing such results "is simply to use telescopic plungers, allowing two or more powers to be provided, in which the larger ones, with the greater lifting power, are clamped down when not required."

Ordinarily five separate rams are required to each crane—one for hoisting purposes, two for moving the bridge, and two for moving the trolley. The power is transmitted by wire ropes. After describing two cranes built some three years ago, the author had the following to say in regard to their working and the advantages derived from the use of wire ropes and hydraulic cranes:

Their performance under the requirements of daily work has been satisfactory in the highest degree; during this time there have been no repairs required whatever, except one or two renewals of the flax packing in the stuffing boxes of the rams. The care and operation of these has, for the whole time, been in charge of ordinary foundry help—one man operating both cranes.

Tests made upon the two cranes, taking them without any special preparation, and with varying loads up to their full capacity, indicated very uniform results in the percentage of friction. In one crane the average was 9 per cent., and in the other less than 12 per cent. of the loads lifted, including dead load.

As chains are so largely used for carrying the suspended loads in cranes, it may appear to some that substituting wire rope for this purpose is attended with risk. The writer does not think this to be the case, and is further of the opinion that there are certain advantages in its use. Wire ropes possess their calculated strength to a degree unattainable in chains. In the question of costs and weights there is a difference in favor of the rope; as, for example, 100 ft. of chain which has an estimated ultimate strength of 28,000 lbs. would weigh over 500 lbs. and cost \$37, while its equal in pliable wire rope would weigh but 60 lbs., and cost less than \$11.

In making a comparison of the lasting qualities of the two, it should be borne in mind that the wearing away to the danger point in the crane chain by use takes place on the inside ends of the links, where the surfaces are in contact with one another. The wear on the outside surface from contact with sheaves and drum will be found comparatively trifling, even where the use has been such that the ends of links are reduced to one-half of their original area. With wire rope there is only the outside surface to wear; with the grooves in wheels turned properly, and with wheels so set that the lead is straight into them, this will be extremely small. There are cases where the large diameter of the sheaves required would be detrimental, but in designing the machine this drawback can be largely avoided. Where the exigencies of the case demand, steel-wire ropes can be used on wheels with diameters as small as 25 times that of the rope for smaller sizes, and 32 diameters for the larger sizes.

To give an idea of what may be expected in the way of lasting qualities, the writer would state that in the cranes referred to, after over two and one-half years of constant service, the ropes are so little worn that they would appear to be good for an equal further use.

The speeds at which cranes can be operated depends largely on the ability to transmit the necessary power to them, and in means for applying power to them in ways which will not result in sudden shocks. This is a feature in which the hydraulic crane excels.

With the application of hydraulic power to traveling cranes, the writer believes that there will be found the following advantages: General adaptability, moderate cost, and simplicity of construction, freedom from re-

pair, ease, safety, rapidity and noiselessness in action, and economy of operating power.

#### ROPE DRIVING.

The transmission of power by cotton or manilla ropes was a few years ago an experiment. It passed the experimental stage, and its use has spread with remarkable rapidity, for use where the amount of power is large, or the distance between the power and the work is comparatively great. The present article will endeavor to give some of the limitations of this method of conveying power, with a close approximation to the true value.

The most prominent questions which the engineer wishes to have answered are those relating to the horse power, wear of rope, first cost of rope, and catenary.

These questions cannot be answered with precision in a general article. Installations which have been successful, as well as those in which the wear of the rope was destructive, indicate that 200 lbs. on a rope 1 in. in diameter is a safe and economical working strain. When the strain is materially increased, the wear is rapid.

The average breaking strength of commercial rope 1 in. in diameter was ascertained to be 7,140 lbs. Expressed algebraically, the breaking strength, weight per foot, and the working strains are:

$$\begin{aligned} W &= 720 C^2 & (1) \\ P &= .32 C^2 & (2) \\ w &= 20 C^2 & (3) \end{aligned}$$

in these and the following equations

$C$  = Circumference of rope in inches.

$D$  = Sag of the rope in inches.

$F$  = Centrifugal force in pounds.

$g$  = Gravity.

$H$  = Horse power.

$L$  = Distance between pulleys in feet.

$P$  = Pounds per foot of rope.

$R$  = Force in pounds doing useful work.

$S$  = Strain in pounds on the rope at the pulley.

$T$  = Tension in pounds of driving side of the rope.

$t$  = Tension in pounds on slack side of the rope.

$v$  = Velocity of the rope in feet per second.

$w$  = Working strain in pounds.

$W$  = Ultimate breaking strain in pounds.

This makes the normal working strain equal to one-thirty-sixth of the breaking strength, and about one-twenty-fifth of the strength at the splice. The actual strains are ordinarily much greater, owing to the vibrations in running, as well as from imperfectly adjusted tension mechanism.

The centrifugal force of the rope in running over the pulley will reduce the amount of force available for the transmission of power. The centrifugal force of the rope is computed by the formula:

$$F = \frac{P v^2}{g} \quad (4)$$

At a speed of about 80 ft. per second, the centrifugal force increases faster than the power from increased velocity of the rope, and about 140 ft. per second equals the assumed allowable tension of the rope. Computing this force at various speeds and then subtracting it from the assumed maximum tension, we have the force available for the transmission of power. The whole of this force cannot be used, because a certain amount of tension on the slack side of the rope is needed to give adhesion to the pulley. What tension should be given to the rope for this purpose is uncertain. It is known from considerable experience that when the rope runs in a groove whose sides are inclined toward each other at an angle of 45 degs. there is sufficient adhesion when the ratio of the tension is

$$\frac{T}{t} = 2 \quad (5)$$

For the present purpose,  $T$  can be divided into three parts:

Tension doing useful work.

Tension from centrifugal force.

Tension to balance the strain for adhesion.

The tension  $t$  can be divided into two parts:

Tension for adhesion.

Tension from centrifugal force.

It is evident, however, that the tension required to do a given work should not be materially exceeded during the life of the rope.

The tension  $t$  required to transmit the normal horse power for the ordinary speeds and sizes of rope is computed by formula (8). The total tension  $T$  on the driving side of the rope is assumed to be the same at all speeds. The centrifugal force, as well as an amount equal to the tension for adhesion on the slack side of the rope, must be taken from the total tension  $T$  to ascertain the amount of force available for the transmission of power.

I have assumed that the tension on the slack side necessary for giving adhesion is equal to one-half the force doing useful work on the driving side of the rope; hence the force for useful work is:

$$R = \frac{2(T - F)}{3} \quad (6)$$

and the tension on the slack side to give the required adhesion is:

$$\frac{(T - F)}{3} \quad (7)$$

$$t = \frac{(T - F)}{3} + F \quad (8)$$

Hence

The sum of the tensions  $T$  and  $t$  is not the same at different speeds, as the equation (8) indicates.

As  $F$  varies as the square of the velocity, there is, with an increasing speed of the rope, a decreasing useful force, and an increasing total tension,  $t$  on the slack side.

Transmission ropes are usually from one to one and three-quarter inches in diameter.

The first cost of the rope will be smallest when the power transmitted by it is greatest, and, under the assumed conditions, will be a minimum for a given power when the velocity of the rope is about 80 ft. per second. The ratio of the first cost of the rope running at any other speed will be:

$$\text{Ratio of first cost} = \frac{H \text{ at } 80 \text{ ft. per second}}{H \text{ at required speed.}} \quad (10)$$

The wear of the rope is both internal and external; the internal is caused by the movement of the fibres on each other, under pressure in bending over the sheaves, and the external is caused by the slipping and the wedging in the grooves of the pulley. Both of these causes of wear are, within the limits of ordinary prac-



tice, assumed to be directly proportional to the speed. Hence, if we assume the coefficient of the wear to be  $k$ , the wear will be  $kr$ , in which the wear increases directly as the velocity, but the horse power that can be transmitted, as equation (9) shows, will not vary at the same rate.

If we divide the value for wear at a given speed by the horse power that the same rope will transmit at other speeds, we get the relative wear of the rope in transmitting 1 H. P. For this purpose assume, for a basis of comparison, such value for the coefficient as will make the wear of a rope running 10 ft. per second equal to 100.

The rope is supposed to have the strain  $T$  constant at all speeds on the driving side, and in direct proportion to the area of the cross section; hence the catenary of the driving side is not affected by the speed or by the diameter of the rope.

The deflection of the rope between the pulleys on the slack side varies with each change of the load or change of the speed, as the tension equation (8) indicates.

The deflection of the rope may be computed for the assumed value of  $T$  and  $t$  by the parabolic formula:

$$S = \frac{PL^2}{8D} + PD, \quad (11)$$

$S$  being the assumed strain  $T$  on the driving side, and  $t$ , calculated by equation (8), on the slack side. The tension  $t$  varies with the speed.

It is to be regretted that accurate data are not available to determine the constants needed in the equations for wear and for friction on the pulley.

Mr. Scott A. Smith believed that the economy of rope driving over that of belts was offset by the additional cost of sheaves, which was about 60 per cent. More attention had recently been paid to the quality of belting and also to the contact with the pulley.

Mr. Weber stated that manilla was not the best fibre for the purpose. English practice had proved that cotton was the best material. Mr. Hunt replied that rope was not a competitor of the belt, but was superior under certain conditions. Cross ropes were not much more satisfactory than cross belting. Mr. Smith added that one-quarter twist belting was much more satisfactory where the belt was properly shaped for the purpose by the maker. The method of doing this was to take an old belt which had shaped itself. This was laid out on the floor and enabled the belt maker to turn out a new one which would work satisfactorily from the start.

Mr. John H. Cooper read a paper on "Accident-Preventing Devices for Machines." The discussion developed the fact that no effective means had yet been devised for the prevention of frequent accidents to the operatives of wood-working machinery, especially the circular saw.

Mr. Ambrose Swasey presented a paper on a "New Process for Generating and Cutting the Teeth of Spur Wheels," an abstract of which follows.

#### A NEW PROCESS FOR GENERATING AND CUTTING THE TEETH OF SPUR WHEELS.

In the new process, which is the subject of this paper, instead of making all gears so that they will run into a rack, the rack is transformed into a cutting tool, and by it the teeth of wheels of any diameter are generated and cut at the same time.

The cutting spindles and the main spindle which carries the wheel are connected by means of change gears, the number of teeth to be cut in the wheel determining the proportion between the two on the same principle as the change gears of an engine lathe, which gives the cutting spindle as many revolutions to one of the main spindles as there are teeth in the wheel.

The cutting tool is composed of a series of cutters rigidly connected, which revolve and at the same time move longitudinally or endwise at right angles to the axis of the wheel to be cut; and at the same speed, it is continually revolving at the pitch line, the motions being the same as in the case of a rack engaging with a revolving gear.

As it would be impracticable to continue moving the whole series of cutters endwise, they are bisected, and these segments are connected in series forming two sections, which revolve upon a common axis, and each section is given an independent endwise motion by means of a cam. When one section is engaged in cutting, it is carried endwise in the same direction and at the same velocity that the pitch line of the wheel is revolving, until disengaged from it, when the cutters, while continuing to revolve, are carried back by the cam to their original position, ready for the next tooth. By means of both sections, as they continually revolve and alternately slide forward while cutting, and back when disengaged, there is a continuous cutting and generating process of the teeth in the revolving wheel. The head carrying the cutters is automatically fed across the face of the wheel, and when the cutters have proceeded once across the gear is completed. The variation in the spacing from one tooth to another is reduced to a minimum, as the series of cutters act upon both sides of a number of teeth at the same time, and serve to average and eliminate any local inaccuracies in the division of the index and driving gears; also to obviate any tendency to crowd the wheel from one side to the other.

The forward motion of the cutters and the revolving of the wheel at the pitch line being exactly the same, the process of generating and cutting the teeth goes on continuously and uniformly around its entire periphery, so that one part is not heated more than another, but all the teeth are cut under exactly the same conditions, and when the revolving cutters have once passed across the face all the teeth in the gear are completed and given the correct form for each diameter of wheel; and as by the Willis theory all gears are cut to run into a rack, so by this process the Sang theory is put into practice and a rack is made to cut correctly all gears.

Mr. Campbell inquired if the same result had not been accomplished by a reciprocating cutting rack. Mr. Swasey replied that it might have been done in that way. Its commercial efficiency had not been calculated. Mr. Hawkins considered that the preservation of equal temperature in the wheel while cutting was in itself of sufficient importance to warrant the adoption of the machine. Mr. Oberlin Smith added that he was satis-

fied, from the points developed by the discussion, that the machine was much more efficient than those generally used.

"An Interesting Experiment with a Lubricant" was the subject of a paper by G. W. Bissell, who said in brief that an experiment was undertaken at Cornell University for the purpose of determining the law governing the variation of the coefficient of friction of a lubricant, and the rate of feed of the same to the journal, all other conditions being constant. The results show that at low rates of feed the effect of pressure on the coefficient of friction is practically nil, which would tend to prove that, under such conditions, lubricated rubbing surfaces follow the laws of solid or "immediate" friction. But at the rate of feed at which this state of affairs begins to be apparent, the augmentation of the coefficient of friction is dangerous to the continuation of the smooth running of the journal, as the rate of feed is reduced to a small amount. Hence it is not advisable to reduce the rate of feed so far as to approximate to this limit. The rate of feed should in every case be so high, at least, that the coefficient of friction will not vary.

This was followed by a paper on the "Performance of a 75-ton Refrigerating Machine of Ammonia-Compression Type," and "Some Novel Experiments with a Lubricant," by Prof. Jas. E. Denton, and "A Single Acting Compound Engine," by William A. Bole.

Resolutions of thanks were passed to the local committee, the Mayor of Richmond, the Governor of Virginia, the Tredegar Iron Co., the Richmond Locomotive & Machine Works, the Chesapeake & Ohio, the Richmond & Danville, the Norfolk & Western, the Richmond, Fredericksburg & Potomac, the Virginia Electric Light & Power Co., the Newport News Shipbuilding & Dry Dock Co., and the citizens generally for courtesies extended. The official programme having been exhausted, the meeting adjourned *sine die* at 12:30 p. m.

Carriages had been provided, and the visitors were then taken to the Tredegar Iron Works, where a luncheon was served on one of the floors, which had been fitted up for the purpose. The venerable president, General Anderson, who has been connected with the works since 1841, in welcoming his guests, gave a brief and interesting history of the establishment, which was started in 1836. It is one of the four foundries selected by the government for the casting of guns, and this was the first important work taken up. The building of engines and machinery for sugar plantations, both for Cuba and the Southern States, followed, and in 1853 and 1855 the steam frigates "Roanoke" and "Colorado" were equipped with machinery, the hulls having been built at Norfolk. Locomotives were also built until the shops were burned during the war. Freight cars are now constructed complete, from Virginia material. Rails were made until the use of iron was abandoned. Car wheels and axles, fish plates, spikes, links, and pins are manufactured in large quantities.

After a general inspection of the establishment, the visitors were taken to the Richmond Locomotive & Machine Works. The extensive shops were found crowded with work, the most conspicuous order being from the government for the boilers and machinery of the U. S. S. "Texas," now building at Norfolk. The very complete plant for locomotive building was highly praised by the visiting engineers, and the capacity of the boiler shops and quality of the product was a surprise to those who are not familiar with mechanical development in the South. Photographs of a complete locomotive and of the cylinder of the "Texas" were distributed as souvenirs. A drive through the city consumed the remainder of the afternoon.

On Friday a special train was provided through the courtesy of the Chesapeake & Ohio, affording among other events of interest an opportunity to visit the works of the Newport News Shipbuilding and Dry Dock Company at Newport News, Va. The shipyard embraces 60 acres of land with 1,825 ft. water frontage. The buildings alone cover five acres. The dry dock which is completed is 600 ft. long, 50 ft. wide at the bottom, 130 ft. at the top, and the draught of water 25 ft. over sill. The time required to empty the dock is 1½ hours. The buildings are as follows: Office building, three stories, brick, 40 x 200 ft.; pattern and joiner shop, three stories, brick, 60 x 300; machine shop, iron and brick, 100 x 300; boiler shop, iron and brick, 100 x 300; blacksmith shop, brick, 100 x 300; bending shed, iron and brick, 60 x 127; ship fitters' shop, iron and brick, 60 x 320; ship blacksmith shop, frame, 120 x 208; power house, brick, 40 x 130; lumber shed, two stories, frame, 40 x 300; pump-house, brick, 43 x 60; paint shop, frame, 40 x 121; stable, two stories, brick, 40 x 60. The dimensions of the piers are: No. 1, 60 x 900 ft.; No. 2, 60 x 350; No. 3, 80 x 350; No. 4, 60 x 550; outfitting basin, 900 x 500, and the eight shipways range from 400 to 500 ft. each. The outlay for the entire plant will be about \$5,000,000. The half hour allowed for the examination of these works was too short a time, but it at least created an impression that the company means business and, together with the blocks of neat brick tenements, proves that Newport News is by no means a "paper" town. An elegant lunch was served at the Hotel Warwick, where Engineer Horace See, who represented the company, was heartily assured that their hospitality was appreciated.

The little steamers of the Atlantic & Danville and Chesapeake & Ohio conveyed the party from Newport News to the Norfolk Navy Yard at Portsmouth, where another half hour was profitably spent, after which they crossed to Norfolk and divided, a portion returning home via the Norfolk & Western to Richmond and the remainder to Fortress Monroe, and thence by steamer to northern points. The meeting and accompanying excursions were heartily enjoyed by all who had the good fortune to participate in them.

#### The City & Southwark Subway, London.

BY AN OCCASIONAL CORRESPONDENT.

This new electric railroad was opened by the Prince of Wales on Nov. 4. So far as the opening trip can be spoken of, the line may be termed a success, but somehow there was a hitch later in the day and a train stuck in the tunnel somewhere under the river for a considerable time.

For some time past there has been felt considerable interest in the Subway, and information has been sought by many as to the method of operation and details of construction. For reasons good enough no doubt to those in the know, absolute silence has been kept, and in the whole concern there has not been found sufficient good sense or courtesy to even pen a civil refusal to any of the numerous applicants for information.

Some little time ago, however, there was a press rehearsal which proved a miserable fiasco, and it has even been said that the whole scheme was under revision so far as regards the motive power to be employed, and that rope traction would again be considered.

However far out the prophets of disaster may have been, it is scarcely to be wondered at that such should have been the case. It is almost invariably the case when a foolish and needless silence is maintained concerning any engineering project that there is something to conceal—some failure to keep dark, which nevertheless gets out somehow. So it has been with the Subway railroad. The motive power has not been a complete success, though it is very doubtful if it has been as bad as report made it. However, it seemed to the wisdom of the promoters that concealment would best serve their interests, and therefore matters have been kept very quiet, and the general public has begun to look on the affair as something of a hoax. Now, however, that the line has been opened with considerable show, it is hoped that no effort will be spared to keep it going.

The motors employed are separate and distinct vehicles, and this is looked upon by one section of the electrical engineers as an error, they believing rather in the employment of motor vehicles without the needless weight of a leading engine.

The London entrance to the new railroad is at No. 48 King William street, close to the monument. Here are the elevators which convey passengers up from and down to the trains. The terminal station is lined with white bricks, as usual for underground work in England. It is, of course, much larger than the tubes which form the line, but still has no great dimensions. The inaugural train consisted of two carriages and No. 10 engine. The number of passengers in all was about 40. It was remarked that the carriages were noisy and rattled considerably, and that this, combined with the rush of air outside, which was said to cause a roaring sound by reason of the jointing flanges of the iron tubes prevented easy conversation.

Speed was kept down to about 17 miles per hour, and no stoppage was made at the Borough or other stations on the line until at Kennington Oval, a distance of two and a half miles, which was reached in nine minutes. Here a few of the party went to the surface in the elevator and then the train went on to the terminus at Stockwell, the journey occupying four minutes more. Half a minute in the two elevators brought the whole party to the surface, and the engines driving the dynamos were inspected, after which the inevitable lunch and speech making.

Should events prove that electric traction is an undoubted success, it is anticipated that an immense extension of the system will soon be made.

At No. 48 King William street the elevators descend about 80 ft. At this depth below the surface the City of London may be called virgin ground. Above are sewers, buried rivers, underground railroads, the foundations of Saxon churches, Roman pavements and baths, and probably relics of the ancient Britons. At 80 ft. down all is unbroken ground except for a considerable number of artesian wells bored through the clay into the chalk rock beneath. London, it must be known, stands on a peculiar site. There is a depressed basin of chalk; this rock, which all around London breaks out on the surface, dips sharply down and the depression is filled by a firm blue clay which weathers brown from oxidation of its contained iron.

Of course, such a material is difficult to deal with in surface work, owing to its swelling when exposed to atmospheric influence, but for the system of boring employed in the subway no material could well be more suitable. As regards the deep water, it is not many years since numerous wells in London had their water level, from the chalk beneath, quite near the surface, while some wells, indeed, actually flowed over. Now, through heavy pumping, the whole water level of the London basin is 50 to 100 ft. lower down, and in some





Fig. 1.

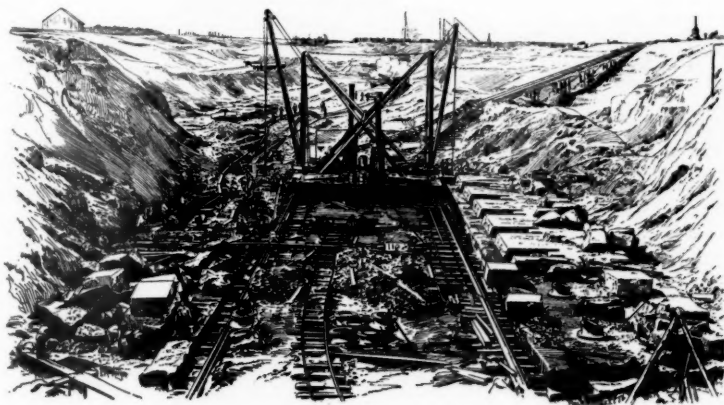


Fig. 2.

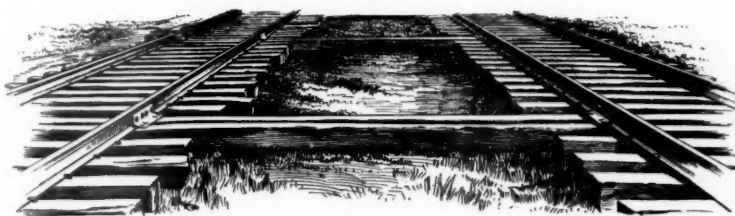


Fig. 3.



Fig. 8.

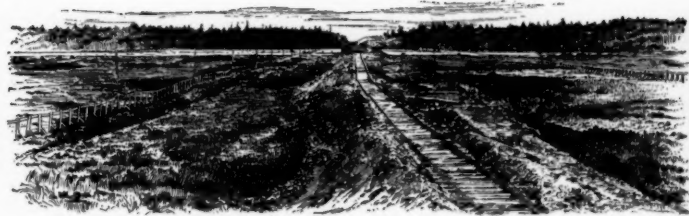


Fig. 4.



Fig. 5.

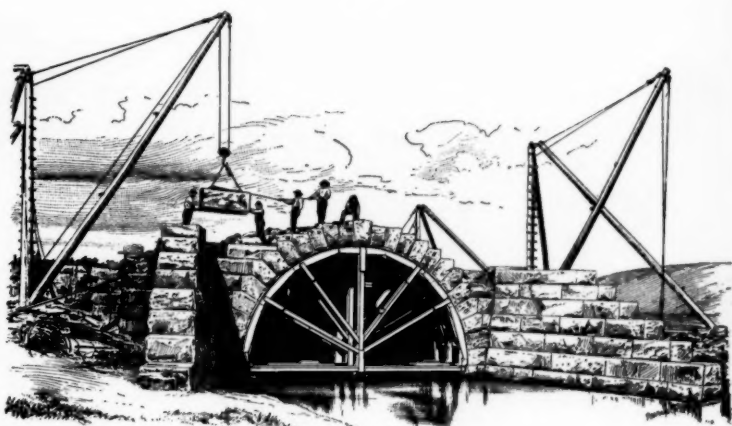
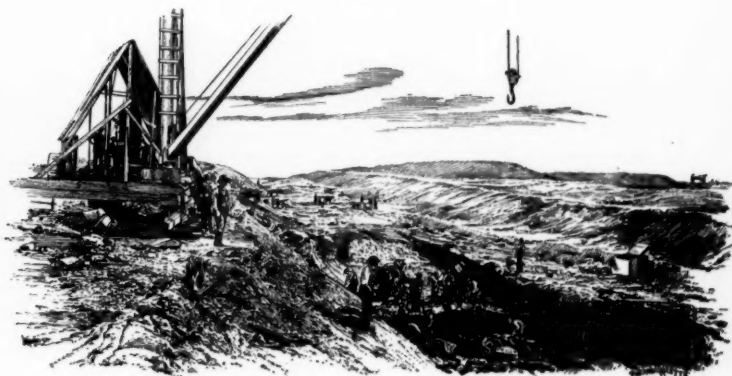


Fig. 6.



**Fig. 7.**

SKETCHES SHOWING THE PROGRESS OF THE CHIGNECTO SHIP RAILWAY.

*From Photographs made in October.*



PLAN OF THE LOCATION OF THE CHIGNECTO SHIP RAILWAY.

*The full line shows the final location, on which construction is in progress. The broken line shows an earlier location.*



PROJECTION OF THE SURFACE OF THE EARTH  
ON A PLANE



PROJECTION OF THE SURFACE OF THE EARTH  
ON A PLANE



parts of the city coincides with the base of the clay, and is even below the top of the chalk, or, at least, of the intervening sands. It is thus easy to see how very simple a matter it will be to extend the tube subways almost indefinitely, the ease with which one line can run parallel with another, dip under it, or climb over it adding to the possibilities of the case. It is to its clay base that London owes its fogs, as well as also, probably, its low death rate, and should subways prove a means of really facilitating travel it will be some counterbalance for the fog.

It is computed that the yearly journeys by rail train and omnibus in London, not including journeys out of it by rail, amount to 500 million. A business man's journey to the city from a point, say, seven miles out from his city station, occupies from 20 to 40 minutes, according to the train being fast or stopping. This is too long a time by far, but the present overhead and subsurface lines are overcrowded with trains, all train lines and omnibuses routes are so congested that it is usually quicker to walk than to take a bus in the city. The Subway system seems now the only hope for rapid transit owing to the great cost of overhead lines by reason of the price of land. The only obstacle in the way of these "rat holes," as the new system is now dubbed, will be an occasionally deep bored well tube. It may give rise to some curious points of dispute should a subway tube be found in the way of a well to be bored or should a well borer perforate the subway.

The fare charged on the new subway is two pence (four cents), which is too high, considering the utmost length of any journey is not over 3½ to 4 miles.

Trains are to be run at two or three minutes headway, and the elevators to be run continuously likewise.

The recent application to Parliament for powers to extend the system was thrown out in committee only this year. It is thought this was largely due to the fact that the present under river line was looked upon as experimental only, and it is very generally hoped that the line will prove so thorough a success as to leave no chance for rejection of any future bill. With so much public sympathy it is much to be regretted that such secrecy has been observed. We regret also that the promoters of the deeply buried subway appeared in evidence against the bill for the shallow subway railroad of last year. Surely in London there is room for both, and ample traffic for both also exists, and only waits to be picked up. As a matter of fact, the rat hole men damaged their own case by the virulence of their opposition to the shallow or gallery scheme, which proposed to follow the line of the streets, but just beneath them, and would have proved of immense convenience and utility.

London, however, is ruled by a handful of shopkeepers and the convenience of 6,000,000 people has to be sacrificed in order that the British public may be obliged to travel or crawl past their shop windows as though the only end of man were to go shopping. Having stayed the progress of the shallow scheme, however, for a time the selfish shopkeeper has probably helped on thereby the rat holes, and these more than the gallery lines will draw people from the streets out of sight of shops.

As soon as the railroad is truly and actually open for traffic I shall take the opportunity of having a paid run upon it so as to see how it works under everyday conditions.

#### TECHNICAL.

##### Manufacturing and Business.

The Lehigh & Pittsburgh Construction Co. has filed articles of incorporation in New Jersey to build railroads. The incorporators are Frederick Knowland, of Plainfield, Cecil Campbell Higgins, of Bartow, N. Y., and John B. Bissell, Jr., of Elizabeth. The company's capital is given at \$100,000.

The United States Wind Engine and Pump Co., of Batavia, Ill., reports that a number of its recent orders have been from some of the most prominent roads in the country. The factory is working until 9 o'clock every week night, principally on railroad and water station outfits and the Mansfield stand pipe. With its system of water stations, they allow the purchasing road to adopt any preferred pumping system.

The Dayton Mfg. Co., of Dayton, O., manufacturers of car lamps, car trimmings and brass goods for railroads, is erecting an addition to its present works and adjacent thereto, 40 x 150 ft. The new building will be two stories high, of stone and brick, with a slate roof. In addition to its regular railroad work, the company has just completed for the New York State Soldiers and Sailors' Home two life-size brass statues, one of a soldier and one of a sailor. They are excellent specimens of workmanship and will be sent forward immediately. Each statue weighs about 550 lbs.

The Niles Tool Works, Hamilton, Ont., are erecting a shop 100 x 400 ft., just south of their main shop. At present and for months past the shops have been compelled to run night and day.

Porch, Gibb & Co., of Philadelphia, manufacturers of car builders' material, have associated with them Mr. Alfred G. Rogers, and they have opened an office at No. 45 Broadway (Aldrich Court), New York City. The firm name has been changed to Porch, Gibb & Rogers.

The contract for furnishing an iron planer, 48 x 48 in. x 16 ft., for the government workshops at Boston Navy Yard, has been awarded to the L. W. Pond Machine Co., of Worcester. Five months is allowed in which to complete the tool.

A. S. Males & Co., of Cincinnati, have just issued circular No. 28 of bargains in logging outfits, No. 29 of rolling stock for steam and mining railroads, etc., and No. 30 of dummy line outfits, which they will mail to parties in need of such material.

##### Iron and Steel.

The Springfield Iron Co., Springfield, Ill., has recently increased its facilities for handling heavy scrap by the

erection of two very powerful shears, one capable of shearing up to 2½ in. round iron, the other up to 5 in. round iron cold. The two shears will cut 1,500 to 2,000 tons of heavy railroad scrap per month.

The Allegheny Bessemer Works were closed down on Saturday last, having passed into the hands of the Carnegie interest, and will be now employed on billets. All orders for rails will be filled at the Edgar Thomson Works.

The Fort Payne Coal & Iron Co. of Fort Payne, Ala. has signed a contract with Philadelphia parties for the right to use the F. G. Bates steel process in the South, and, it is stated, has made arrangements for the construction of a plant in Fort Payne at once.

The new spike mill of the Midway Iron Co., at Roanoke, Va., is almost completed and will soon be put in operation.

The Bethlehem Iron Co. has completed and started up its new triple compound rail mill train, whereby steel rails of one, two or three lengths are finished direct from the converting vessels. By this new process the output will be considerably increased, and most gratifying results are looked for.

The Eureka Cast Steel Co., of Chester, Pa., is adding to its plant an open hearth furnace of the Siemens-Martin type, eight tons capacity. The work is being erected by J. A. Herrick, Bridgeport, Conn., and is to be completed by Feb. 1, 1891.

The Scranton Steel Co., of Scranton, Pa., rolled 491 Bessemer steel ingots into blooms during one turn of 12 hours on Oct. 30. The blooming was done with a single train, and 56 of the ingots were handled during the last hour, between five and six o'clock.

The Great Northern Iron & Steel Co., capital stock, \$2,000,000, has filed articles of incorporation at Duluth, Minn.

There are negotiations between the Lackawanna Iron & Steel Co. and the Scranton Steel Co., for the purchase of the latter company, which are not yet concluded. It is probable that nothing will come of the matter.

The East Chicago Steel Works, at Hammond, Ind., have been purchased by a Cleveland and Youngstown syndicate, composed of persons largely interested in Brown, Bonnell & Co. It is understood that the new owners propose to put the Bessemer steel converters into operation and make additions to the machinery for the purpose of diversifying the product. The erection of one or more blast furnaces is contemplated in order to be independent of the producers of pig iron.

The Buena Vista Steel Co. has been incorporated with C. M. Clark, of Philadelphia, Pa., as President; A. T. Barclay, Vice-President, and G. F. Baker, Secretary, to construct a steel plant at Buena Vista. The capital stock is to be \$250,000.

The orders received by Bryam & Co., Detroit, Mich., during October were for 17 Colliery cupola furnaces, having a daily melting capacity of 664 tons.

The Railway Automatic Signal Co. has been organized at Lynchburg, Va., with T. N. Davis as president and T. J. Ingram, secretary, to manufacture Alexander Robertson's railway automatic signal. The capital stock is \$100,000.

A machine shop and foundry is shortly to be erected at Rockford, Ill., for the manufacture of railroad specialties. The main building will be 100 x 40 ft., two stories high, with brick walls.

##### The Rail Market.

Steel Rails.—All the mills report that very few orders have been received for next year's delivery, and there are no inquiries. The quotations are nominally, in the East, \$23.50@24, and at Chicago \$30@31.50.

Old Rails.—The market is dull and few sales have been made. The quotations are nominally: New York, \$24.50@25 for iron and \$20@21 for steel; Pittsburgh, \$28@28.50 for iron and \$18@19 for steel; and at Chicago, \$25.50@26 for iron and \$16.50@20 for steel, according to strength.

##### Bids for Armor-Piercing Projectiles.

Bids were opened by the War Department last week for supplying armor-piercing projectiles for the new steel guns now being constructed for seacoast defense. The bids received were as follows: Carpenter Steel Co., of Reading, Pa., 8-in. shot, \$150 each, 10-in. shot, \$285 each; Midvale Steel Co., of Pennsylvania, 8-in., \$150, 10-in., \$287; Sterling Steel Co., of Pittsburgh, 8 in., \$300, 10-in., \$575. For the purpose of securing a supply of armor-piercing projectiles Congress appropriated \$100,000 to decide the question as to whether or not American steel makers can produce shot and shell equal to those made in Europe. The requirements of the Ordnance Bureau are based upon European tests. The 10-in. shot, which will weigh 570 lbs., will be fired at a velocity of 1,625 ft. a second, and must pierce a steel plate 11.2 in. thick, and emerge without crack or material deformity. The 8-in. shot, fired under the same conditions must pierce a plate 9 in. thick. Contract for supplying the projectiles has not yet been awarded.

##### The Channel Bridge Soundings.

Two steamers have lately been employed under English and French auspices in making soundings for the proposed Channel bridge between England and France. The line suggested, which has a curve in it, was first sounded and found to be very favorable as regards solidity and stability, and also to be shallower than was expected. M. Renaud, a hydrographic engineer, who was designated for the work by the French Minister of Marine, also investigated another route, a little further north, on which a perfectly straight line can be obtained with a better foundation and less depth of water. This route would be four kilometres shorter, and would therefore considerably decrease the cost of construction. It also appears to be less exposed to the wind, which would prove a great advantage, especially during the progress of the work.

##### Detroit Lubricators.

Probably the largest single order for locomotive lubricators ever made was recently filled by the Detroit Lubricator Co., when it shipped 633 lubricators in one lot to an English colony. These lubricators are for the equipment of the entire government railroad system of the colony.

##### Westinghouse Infringement Suit.

Two bills in equity for the alleged infringement of six patents on air brakes were filed in the United States Circuit Court, in New York, this week by George Westinghouse, Jr., and the Westinghouse Air Brake Co. against the New York Air Brake Co. and Isaac B. Newcombe, Royal C. Vilas, Charles A. Starbuck, and John C. Thompson, Directors. These patents cover the Westinghouse quick-acting brake. The West-

inghouse company asserts that the New York Air Brake Co. is simply appropriating its entire apparatus, and the suits are for an injunction and for an account of damages and profits.

#### THE SCRAP HEAP.

##### Notes.

The Wheeling & Elm Grove road has commenced the erection of a new machine shop and roundhouse at Wheeling, W. Va.

##### The Pennsylvania Ship Canal.

The commission appointed by Gov. Beaver to examine into the feasibility of a ship canal between Lake Erie and the Ohio River met in Pittsburgh, Pa., Nov. 12. The report of the engineers showed that such a canal is feasible. The route surveyed is 125 miles long. Several routes have been surveyed, and the one selected is not a difficult one. The total lockage required is only 730 ft., to be overcome by 39 locks. The estimated cost is \$23,000,000 for a canal having 12 ft. of water to accommodate the largest steamers which ply on the lakes.

##### The Wheeling Union Station.

The Wheeling Bridge & Terminal Railroad has prepared maps and ordinances to be presented to the city council of Wheeling, W. Va., granting it the privileges necessary for the establishment of a Union passenger station and terminal facilities, roundhouses and the like for the care of cars and locomotives of the various roads using it. It is to be located at Market and Eighteenth streets, and the tracks will extend several hundred yards along the banks of Wheeling creek to Woods street. The company has already purchased all the property in the section wanted, which can be had without condemnation proceedings, and such proceedings have been begun in the Circuit Court against several property holders.

##### Three Train Accidents.

On the night of Nov. 12 a southbound through train of the Southern Pacific was derailed on a trestle near Salem, Or., and the whole train, containing over 100 persons, went down 15 or 20 ft. into a lake. Two employees and two passengers were killed and a dozen others badly injured. No explanation of the cause of the derailment is given, except a dispatch from Portland the next day saying that "it is thought that a rail was removed by tramps."

At 6.37 on the morning of Nov. 14, during a dense fog, westbound express train No. 9 on the Pennsylvania road, which had stopped at New Florence, a short distance west of Sang Hollow, to take water, was run into at the rear by a mail and baggage train, wrecking the rear car, a sleeper, killing 4 passengers and injuring 15 or 20 others. No clear explanation of the cause has yet been given. One account says that the foremost train was moved backward after having passed the station, and another says that the block signal operator admitted the second train to the section before the first had cleared it. It is said that No. 9 had been standing only a minute and a half when it was struck.

On the morning of Nov. 17 a switching freight train of the Kansas City, Wyandotte & Northwestern while crossing the bridge over the Kaw River, at Kansas City, fell with the bridge to the stream below, when it had proceeded about half way across. Besides the crew there were upon the train a large number of men and boys who had boarded the train to ride to their work, and nine persons were killed outright. A number were injured, and at last accounts two were still missing. No information is given concerning the cause of the failure of the bridge.

##### Another Fast Mail Train.

The Post Office Department has arranged for another fast mail train between New York and Chicago, via the New York Central and the Lake Shore & Michigan Southern. The new train will leave New York daily at 9:10 a. m., Albany, 12:28 p. m.; Buffalo, 8:10 p. m., and reach Chicago at 9:30 a. m.

##### The Northern Steamship Co.'s Fleet.

In an article, descriptive of a picture of the "North Wind" from an instantaneous photograph, the *Marine Review*, of Cleveland, says the six steel steamers of the above mentioned company, which is the lake line of the Great Northern Railroad Co., plying between Duluth and Buffalo, will have carried between the opening and closing of navigation 500,000 tons of freight, including 1,300,000 barrels of flour, but that they are unable to transport all the freight offering and are making preparations for increasing their fleet by four new steamers, two of which will probably be passenger steamers, elegantly equipped and so arranged that when the passenger season is over they can carry 3,500 net tons of freight through the Soo canal.

The boats of this line have so far been built by the Globe Iron Works, Cleveland, and are all of one pattern, strictly freighting boats, 292 ft. on the keels, 312 ft. over all, 40 ft. beam and 24½ ft. molded depth, with straight stems and flush decks. All have triple expansion engines, with cylinders, 24, 38 and 61 x 42, and two boilers, 14 x 12½. They have six hatches for handling freight, and a line shaft with two drums at each hatch enables a boat to handle 90 barrels of flour at one time, as each drum will hoist eight barrels. They are also fitted with electric lights and Providence windlasses.

##### Coal Discoveries in Victoria.

Although Victoria is the foremost of the Australian colonies in the value of its manufactures, it has labored, until lately, under the disadvantage of having to import all of its coal from the neighboring colonies of New South Wales and Queensland. Prospecting and extended borings with the diamond drill, or rather a drill constructed on that principle, in which hardened steel takes the place of diamonds, has, within the past year or so, resulted in valuable discoveries in Gippsland, at and near Morewell, about 80 miles from Melbourne. Nearly all of these coals so far discovered are brown coals of varying degrees of hardness, but one deposit of black and lustrous coal 15 ft. thick has been discovered, which a representative of the *Colliery Guardian* says contains 33.35 per cent. of volatile matter and 43.55 per cent. of fixed carbon, contains no sulphur, does not clinker, burns down to a white ash, and used for melting pig iron it produces a casting of better quality than that obtained by the use of coke. These deposits are very thick; one is 27½ ft. thick, with two seams under it, one of 10 and the other of 16 ft. But a late discovery probably exceeds any other deposit now known, if a dispatch to the Minister of Mines for Victoria is correct. This is reported to be 597 ft. in depth, with only three small bands of clay parting! This is probably brown coal, and will probably insure the colony sufficient coal for steam making and domestic purposes for some time to come.





Published Every Friday,  
At 73 Broadway, New York.

#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Board of Direction of the American Society of Civil Engineers has expressed the opinion that Mr. Trautwine is not eligible to the office of Secretary. The reasons for that opinion are not given, and we fear that that respectable body did not take competent legal advice before committing itself. We ask the attention of the Board and of all members of the Society to the opinion of an eminent firm of lawyers given on another page. From that it appears that a non-resident is not eligible to nomination by the Nominating Committee, but that he is eligible to nomination by any other five members; that his nomination by any five members, not officers, is regular; and that whether he is or is not formally nominated he will be duly elected if he receives the requisite number of votes. To such absurdities does that wonderful fabric, the Constitution of the American Society of Civil Engineers, reduce itself. But the spirit of the Constitution is not so difficult to discern as its letter is hard to reconcile. Doubtless its spirit would be complied with by Mr. Trautwine's removal to New York if elected. Plainly the intent of the constitutional provision is to secure the presence in New York of the officer and not of the candidate. It further appears, as we surmised, that the Society may delegate to any member the right to vote as a director or trustee, whether he has or has not the right to vote as a member. There appears, therefore, to be no question that Mr. John C. Trautwine, Jr., is eligible to office as Secretary, and we have never heard any doubt of his eminent fitness. We would suggest that five members, not officers, and not on the Nominating Committee, forward to the Board of Direction a ticket containing Mr. Trautwine's name as Secretary, and that all members who wish his election vote for him, regardless of the opinion of the Board of Direction. Thus he will be formally nominated, and if he receives votes enough will be duly elected.

The figures of railroad economy in British India, which we publish elsewhere, show how little can be learned from a mere comparison of nominal rates in different countries. When we hear of passengers carried for little over half a cent a mile it seems extremely low. But if this result is accomplished by running only one or two trains a day each way and forcing two or three hundred passengers to travel on that train, whether its hours suit their convenience or not, the result does not appear so remarkable. This is approximately what is done in India. The passenger service over the whole system averages less than two trains a day each way. The train loads are enormous. The result is that with rates one-quarter as high as our own the train mile receipts are actually larger. The Hindoo, for the sake of the low rates, is ready to travel at such times, at such speed, and under such conditions as suit the convenience of the company. Would a thickly settled American com-

munity do the same thing? Obviously not. The time and convenience of the American is of more value to him. He cannot afford to wait half a day to save ten cents. Every American community demands a train service rather in advance of what can be made directly profitable. The call for more trains and better trains is louder than the call for lower rates. If the Hungarian and the Hindoo are content to have inconvenient trains they can have them cheap. The Hindoo can have them cheapest, because he is willing to put up with the most inconvenience. But this is no proof that the American railroad or American traveler ought to take the practice of either of these countries as a standard.

The one-way party rates announced by the Pennsylvania lines west of Pittsburgh, as shown in our traffic column, are somewhat of a novelty, nothing of this kind having been openly done since the advent of the Interstate Commerce law. Of course the normal method of making reduced rates to theatrical people or anybody else would be to make a straight reduction in the price per capita, but Mr. Ford's answer to this, as was to be expected, is that he is doing only what his competitors have done secretly. It is not improbable that there will be less disturbance of rates generally than would have been the case if the reduction had taken the form of a decided change in the rate in cents per mile. So far as the strict letter of the law is concerned, the issuance of passes in this manner, if done openly and in accordance with properly published notices, is probably not illegal. In fact, the purchaser should be the one to complain, as his eleventh ticket, which he pays for as really as he does for the other ten, probably has printed upon it certain conditions making it less desirable than the others. The allowance of 300 lbs. of baggage for each person is, however, a practical discrimination in favor of theatrical parties against other parties of ten, who generally have less rather than more than the usual quantity. True, it is inequitable to carry 150 lbs. of baggage for a single passenger on an ordinary ticket when the next man pays the same price for his ticket and carries no baggage, but the Pennsylvania arrangement carries that same injustice farther. The Pennsylvania takes this action in the face of the unanimous disapproval of the other roads in the Central Traffic Association. At the same meeting Mr. Ford introduced a resolution providing for 1,000-mile tickets throughout the whole of the Association's territory to be sold at two cents a mile. Whether the tickets are to be used interchangeably on all the principal roads is not clearly stated in the reports.

The rapid transit commission of Philadelphia, which is trying to map out a system of suburban railroads to give the people of that city better accommodations than are afforded by the existing railroad lines, has created an advisory board of engineers, composed of the city engineer and four railroad officers. One of the latter is Chief Engineer Brown of the Pennsylvania, and he astonished his colleagues last week by the announcement that the Pennsylvania is constantly losing money on its suburban traffic and wants no more of it. Mr. Brown said:

"We send a train of six cars out to Paoli (10 miles). Enough people get off from Powelton avenue to Fifty-second street (three miles) to empty two coaches. We are obliged, therefore, to haul these two empty cars from Fifty-second street to Paoli and back again, just to accommodate the West Philadelphians. By only taking four cars from Broad street we could make a profit, but by taking six we lose money. There is no money in local passenger traffic, but there is in through business. The Pennsylvania Railroad would much rather that the people who get on its trains at Powelton avenue would come into the city on street cars."

The answer which is doubtless made by the city committeemen is that the two cars for the three-mile trip should be run in a separate train and be made to earn additional money by running back to Broad street three or four times during the time they now spend in uselessly traveling to Paoli and back. Under former conditions the Paoli train could have placed them on a side track to be again taken on the return trip, but people have now learned not to put up with delays of this kind, and roads have learned that switching of this sort is expensive. Mr. Brown acknowledged that certain short trip trains (Chestnut Hill branch) were profitable, but yet did not say why such trains were not run to Fifty-second street. Possibly the traffic now fills the main tracks so full that any increase in the number of trains would necessitate additional main tracks. This may well be true in a few years if it is not already, and the Pennsylvania's argument may not be so absurd as it seems. Passengers paying three cents a trip or less need to flock into the cars in very large crowds if they are to

be carried profitably where the roadbed costs \$500,000 or more per mile. There are plenty of instances where new roads which are badly needed cannot be built because no one dares to invest in the requisite real estate, and possibly this is a parallel case.

The Oregon Railroad Commission seems to be in a decidedly "mixed" condition, and the *Portland Oregonian*, in a two-column article about the board, says the members are as "helpless as infants, doing nothing but draw their salaries and make an annual report." The aim of the people of Oregon in creating a commission was to follow the usual Western example and govern the roads with an iron hand; the chief idea of the promoters of the law being to reduce freight rates. The first attempt to do anything in this line was, however, met by a decision of the state courts holding that the law was hopelessly ambiguous and that the Commissioners could do nothing but investigate and make recommendations. At this point Governor Penoyer took a hand and summarily removed the Commissioners. Political motives are apparently responsible for many of the things that were done at this time (about a year ago) and the reasons for much that was done are inexplicable at this distance; but the Legislature overruled the Governor in several of his acts, and there is a Commission still in existence. It has done nothing of any account, however, and the latest move is a suit by one of the Commissioners elected by the Legislature to oust one of the members of the board sustained by the Governor. It appears that the controversy will not come up again until the February term of the court, but meanwhile the Governor is trying to make the Commissioners who have drawn their salaries refund the money to the state.

#### The Financial Situation.

In one respect the present commercial crisis is quite unlike its immediate predecessors. The crises of 1873 and 1884 were directly connected with American railroad speculation. To-day the connection is an indirect one. The immediate causes of the present fall in values must be sought in remote quarters of the world. The whole disturbance shows the extreme closeness and complexity of international relations as they now exist.

The ultimate cause of this crisis, as of every other, is the attempt to do an increasing volume of business without a corresponding cash reserve; but this time it is Europe instead of America which has been the offender. In the last ten years the gold production of the world has amounted to about \$1,100,000,000; of which between \$600,000,000 and \$700,000,000 have been used in the arts, and over \$400,000,000 accumulated in the United States; leaving Europe practically no increase of gold reserve with which to secure her widening operations.

As long as the credit of the leading European banking firms was untouched, there was perhaps no great danger in this state of things. But the events connected with the downfall of the copper syndicate did something to shake public confidence in the good judgment of the leading bankers. Not a few of them were found to be involved in an operation of questionable character, and, as the event proved, of worse than questionable wisdom. While it impaired the solvency of but a few, it weakened public reliance in many more.

Next came the crash in the Argentine Republic. The situation in that country is not unlike what ours was after the crisis of 1873. There had been an inflation of values of every kind, which could not be indefinitely maintained; it has now turned out that these values were fictitious and no holder of Argentine securities knows where he stands. Prominent European bankers who had made large investments in that country were placed in a position of great difficulty, where it became imperative to increase the means of meeting their obligations. All this had an important effect on the demand for American securities. It heightened whatever elements of distrust already existed. If stocks like Illinois Central and Rock Island, not to speak of worse instances, were unsettled in value, the foreign investor did not feel secure in holding anything. If a storm was to come, he wished to have cash or European securities in his possession. Hence came an inevitable fall in the value of railroad stocks and bonds, good as well as bad; not due so much to diminished confidence in their earning power as to diminished desire to hold them at all. It is a case where more demand for ready money means lessened readiness to invest.

Thus far the crisis as a whole has been much less severe in New York than in London. We have no failure to record which amounts to one-hundredth part



the importance of Baring Brothers. If our financial houses can continue to weather the storm we believe that the crisis will be on the whole a good thing for American railroad operation. We are as yet far from having adapted ourselves to the Interstate Commerce Law and the state legislation which has followed it. Efforts to produce something which shall take the place of pools are far from successful. If anything of the kind is to be arranged it can be much better done under a slack demand for investment than under an active one. In the latter case, no sooner does an arrangement become at all profitable than new lines are built which absorb the profits and upset the agreement. But if the investment demand is slack, there is more time to organize permanent combinations, which may become strong enough to avoid disturbing elements. The Southern Association, the Trunk Line Pool, the various Missouri River pools and most of the other more important advances in traffic organization were made during the years following the crisis of 1873, in a period of reluctance to make investments. There may be a chance for the same thing in the immediate future.

The Interstate Commerce Railway Association was framed with the avowed object of restoring the confidence of investors and their readiness to put capital into American railroads. We criticised this purpose at the time, saying that it was primarily important to improve the methods of traffic economy; that investors' confidence must follow rather than precede such improvement in methods; and that the attempt to bolster up an artificial confidence in any other way would simply defeat its own end. The events have proved the truth of this judgment. Nothing could have been a worse misfortune than to have had more railroads built in the country west of the Mississippi than there are to-day. They would have aggravated every evil under which we suffer. It is because investors were not confident that we stand some chance of solving the traffic problems which confront us to-day. From the railroad man's standpoint, the present reluctance to buy railroad investments may be regarded as a safeguard against duplication of lines, and to some extent also against reckless legislation. Nothing brings legislators to terms so quickly as a cessation of the investment of capital in their locality. If they can get the capital any way, they are glad to pass laws reducing rates; but, rather than go without it altogether, they are only too happy to let capital make remunerative charges.

#### A Lesson in Brake Practice.

In another article we say something about the recommendations made by the Massachusetts Railroad Commissioners in their thorough report on the Quincy accident. Here we wish to call particular attention to what they have to say of the bearing of this terrible accident on air brake practice. This is a point which we have not seen brought up before in what has been written concerning the accident.

It is indeed, as the Commissioners say, "An impressive consideration that if the train had not gone the last 45 ft. none of the passengers would have been killed or even seriously injured." But in fact 23 persons were killed and 30 injured. In the number of killed and injured the accident was one of terrible magnitude; but it is probable, if not certain, that had the brakes been as efficient as they might have been the damage would have been confined to the destruction of property.

From the Board's report it appears that the forward car ran about 640 ft. after the brakes were applied and 250 ft. of this distance after it was derailed. The other cars followed close behind this one; two of them having run some distance on the ties. The fourth car in the train was not entirely derailed before it struck the wrecked engine, but was moving quite slowly. After it struck the engine it ran perhaps three-quarters of its own length, and it was in this part of its onward movement that all of the harm to life and limb was done, so that it is very safe to say, as the Commissioners do, that if the train had stopped 45 ft. sooner no one would have been killed or injured.

That the train would have to run 45 ft. less distance had its brake equipment been up to the best standards there is hardly less doubt. We have not the data to make a precise calculation as to what advantage might have been gained, and there is one great element of uncertainty affecting such a calculation which could never be eliminated; that is, the fact that the engine and several of the cars ran a good way on the ties. The Board assumes that had the driver brake been cut in the train would have stopped 28 ft. sooner. This is based on the facts that

the weight on the drivers was 8 per cent. of the train weight and that the engine ran 380 ft. after the train brakes were applied. This assumption is evidently within the limits. Had 8 per cent. more of the weight of the train been braked it is fair to suppose that but 352 ft., instead of 380, would have been run while the engine was still attached to the train. Again, the weight carried by the unbraked wheels of the Pullman was 3 or 4 per cent. of the total train weight, and it is probable that 3 or 4 per cent. of the 640 ft. run by the train might have been saved had these wheels been braked, that is 19 to 26 ft., say 22 ft. Again, had all the cars been equipped with the quick-acting valve and 1-in. train pipe there might have been a gain of one second in the time of application, or 44 ft. in the stop, from a speed of 30 miles an hour. We have then a total of 94 ft. that we may say, speaking well within bounds, could have been saved in the length of this stop with the driver brake cut in, brakes on all the wheels of the Pullman and quick-acting triples on all the cars; but less than half of 94 ft. would have saved the lives of all those 23 persons.

This must be a sad reflection to the officers of the road. To be sure, they may have supposed that their brake equipment was quite up to average modern practice, and we have no doubt it was. Certainly the table showing the equipment of the passenger cars on New England roads which is published with our synopsis of the report indicates that the Old Colony is not behind most of its neighbors in this matter, and we hope that they will learn the lesson of its misfortune.

We have so many times in the last two or three years pointed out the immense importance of doing precisely what the Board so forcibly recommends, and further, of maintaining all parts of the brake gear in the highest efficiency, that it hardly seems worth while to say more on the subject now. This accident is a terrible demonstration of the importance of having brake equipment up to the highest standard of efficiency. A brake equipment of moderate efficiency will answer for all daily requirements; but sooner or later the time will come when the difference between that and the best will be the difference between life and death.

#### Hauling Capacities of Freight Locomotives.

On another page will be found a table showing the actual hauling power of freight locomotives in service on several roads. This table shows principally the margin of hauling capacity above the resistance of trains on a level, which is necessary in order to overcome the maximum resistances which occur in starting trains, and on grades. Even to start a train within a reasonable distance requires more power or hauling capacity than to overcome a considerable grade. This perhaps is best seen from an examination of the weight on the drivers of locomotives used to haul passenger trains. When the trains are at speed, 3,000 to 4,000 lbs. pull will generally keep them in motion on a level track at 40 miles per hour. The locomotives used, however, generally weigh about 33 tons on the drivers. If adhesion be one-quarter of the weight on the drivers, then the hauling capacity will be about 16,000 lbs. Now at starting all this adhesion is used and often sand is required. It is this excess of adhesion necessary to accelerate trains that is noticeable in the table. If only sufficient weight were used to give a hauling power equal to the resistance of the train on a level road, there would not be anything like sufficient power to accelerate the train to a desired speed in a reasonable distance, or to start it from rest.

The table illustrates one of the defects of a class of propelling power which depends upon adhesion. This demands that the weights of the locomotives be such that they can accelerate a train—weights useful therefore only during a small percentage of the time; while during the remainder of the time of service they must drag about a large excess of weight. This point is not presented with sufficient force in comparing train resistance tests. In some cases recently published surprise was expressed that such a large proportion of the total train resistance should be found to be directly attributable to the locomotive hauling the train. Whereas, if the amount of resistance due to the locomotive and tender simply because of the weight had been deducted from the observed resistance of the locomotive and tender, the result would have been a very reasonable allowance for engine friction and atmospheric resistance. In one case where the locomotive and tender consumed 60 per cent. of the power, over 45 per cent. actually belonged to it because the weight of the engine and tender was 45 per cent. of the total weight of the train. The remaining 15 per cent. was a reasonable allowance for internal friction and atmospheric resistance at 40 miles per hour.

The table is useful chiefly to show the weights on drivers of locomotives actually used to haul trains of known weight under the ordinary condition of service. That there is a wide margin of hauling capacity over and above the resistance of the train hauled will not cause surprise, as such an excess will always be necessary to start trains within a reasonable distance, and if an examination be made of the conditions of passenger train service in this respect, it will be found that in it the excess is greater yet.

Neither are these results to be taken as representing the best that is done or can be done by locomotives in this country. By using sand in starting, with a cleaning device back of the driving wheel to remove grit from the rails, much less weight on drivers would be necessary, but there would be of course an increased wear of tires. However, to operate trains quickly and to save time in making up trains at stations, in freight service, the excess here shown is necessary, and the faster the train time between stations and the better the service, the greater will this excess have to be.

#### The Quincy Disaster and the Use of Track Jacks.

We print in another column a summary of the report of the Massachusetts Railroad Commissioners on the derailment at Quincy in August last. The investigation of the facts of the case appears to have been very thorough and the report has been prepared in excellent shape. The precise details of the practice of railroads in the use of track jacks is so hard to get at and their rules are so lacking in definiteness that it was hard to come to any satisfactory conclusions based on the results of experience. The roads which answered the Board's inquiries make reference to a variety of rules and give various explanations of their actual practice; but nearly all of them leave the question at loose ends and make little headway at reconciling their practice with their rules.

Concerning the facts of this accident and the minor lessons to be learned from it, the conclusions of the Board will not be questioned. It is probably true that in this case the jack should not have been placed on the inside of the rail. It should not have been under any part of the track on the time of a passenger train at such an obscure point. It should not have been allowed for a single moment, while in use, to pass out of control of the man in charge of it. The track jack is dangerous, and those railroad managers and others who profess to regard it as otherwise must be understood as giving careless expression to opinions which they have not precisely defined in their own minds. The degree of danger depends, of course, upon the vigilance with which trains are warned, but while it is actually in position some man must stop approaching trains or else remove the jack.

If a jack may be used at all, the regulations should be such as to permit its use between the rails as well as outside of them, and this can be done with perfect security. It is by no means true that a rule requiring a jack to be removed on the approach of a train on either main track (which is necessary when the lever extends out so as to touch cars on the adjoining track) destroys its usefulness, and the Board might well have gone more fully into this part of the question. The verdict should also have been more explicit concerning the desirability of using the jack only for the minimum time necessary. The jack should give the "lift" to the track and should be removed promptly as soon as the two adjacent ties are tamped sufficiently to support the rails in place. This is a comparatively short time, and a rule on this point would often deter men from carelessly leaving the jack in position longer than the work required. Any extensive work of "raising track" should always, of course, be carried on under the protection of a "slow order" and cautionary signals.

The Board rightly places the chief responsibility on the section master, but it appears that the roadmaster, when examined before the Commission, to all intents and purposes sustained Welch in not having a special man on guard as a lookout. In other words, the roadmaster regards the time which a fast train would use in running 540 ft. (less the time it would take to give the order to the laborer) as long enough for the removal of a jack. It is hard to believe that this is the deliberate opinion of an intelligent roadmaster. But in view of what we learn from experienced officers of maintenance of way we have here an exhibition of just such laxity of thought as may be found on many roads. The absence from the Old Colony book of rules of any clause relating specially to the use of jacks threw upon the roadmaster the burden of looking out for that matter himself. The fact that he did not regard Welch's practice dangerous indicates a lack of



forethought, which suggests a sharp inquiry on many other roads. The Board might well have questioned not only the Old Colony but the other roads in the state concerning the practice of their roadmasters in instructing section masters and in watching them to see that they carry out the instructions.

But, as we intimated in the discussion of this case when it occurred, the foregoing points will be regarded by many as secondary, and they will turn at once to the principal conclusion of the Board, that concerning the rules under which jacks should be hereafter used. In this conclusion we think the Commissioners have gone too far. We are not sure but their fault is chiefly a failure to state with precision what is meant by "protection"; but as it will be understood by railroad officers, their conclusion means that the track jack must never be used unless a flagman with a red flag or light and torpedoes is posted from 160 to 250 rods from the obstruction, with instructions to stop all approaching trains.

This is not only impracticable where trains are at all numerous, but is wholly unnecessary. If this opinion of the Board is to be taken as the standard, the use of the track jack must be given up under many classes of circumstances where it is now used, for the rules pertaining to the display of danger signals when there is a positive "obstruction" (as a rail out) require a thoroughness of protection which is practically out of the question in mere surfacing; that is, it is easier to get along without the jack than to do the necessary signaling. Is it necessary to adopt such a radical rule?

Let us look at the conditions in the two cases. If a rail is broken or has been taken out, or it is necessary to keep a hand car on the track, the practically universal rule is to send out a red signal, in charge of a man, who shall stay with it; and in addition he is to put torpedoes on the rail. It is true that section masters may often be lax about the torpedoes and may not carefully regard the specification as to distance (generally 2,640 to 3,520 ft.); but this is the rule, and we are discussing rules now under the assumption that they are to be enforced. This rule applies on straight lines as well as on curves, and in clear weather as well as during a fog. It applies at all times, as section men are instructed to look out for trains at any time. The unexpected train may be a directors' car, traveling at a high speed, and the question of danger to human life is scarcely less important "between times" than when a passenger train is due. The man must be sent, absolutely, even if when he reaches the required distance he is still in full view of the men doing the work, for it is not safe to depend upon the possibility of warning the engineer by shouting or by any other means of attracting his attention. The main signal must appeal to his eye, and it must be placed sufficiently far away to admit of his stopping after he sees it at short range. We cannot assume that he will see it a long distance before he reaches it. An audible signal must be very loud, and of course must be where he will be sure to hear it some distance before he reaches the obstruction.

Track work which renders the track unsafe for the fastest trains is done under the theory that the section master has the right to the road and that a train approaching unexpectedly must stop for the signal and wait for him. The theory under which surfacing is done, however, is that under which the track jack was being used at Quincy and is used everywhere, so far as the present discussion is concerned, is that some train has the right of the road and that the section master must give it a clear track. The relative rights of the section master and the locomotive runner are reversed, and here lies the difference between the rule which applies to the one case and that which should apply to the other. The Commissioners have very forcibly stated that the section master's neglect was in not keeping a lookout. That is precisely the point, and their recommendation as regards this rule should look simply to the improvement of the means for establishing this safeguard. All will agree that a man needed to be sent out, but the point is that he should not be sent out as a flagman. His duty is not to stop the train, but to warn the section master to clear the track. A rule to cover this point is quite different from the flagging rule which we have outlined above. On a straight line on a clear day this lookout man often need not go out a single step; in fact, the section master himself, if the work of supervising his workmen is not too engrossing, could keep a good lookout without assistance. Unlike the engineer, the section master can be depended upon to see a long distance, as he can, in case his view is suddenly obstructed, instantly remove the jack. On a single track he could often trust himself to recognize the approach of a train, even through a dense fog; and there are other situa-

tions where he could depend wholly upon his sense of hearing. On a sharp curve, on the other hand, he might often find it necessary to have not only a lookout, but to station one or two intermediate watchmen to convey the signal from the furthestmost man when a train approached. The minimum limit mentioned by the Commissioners for the man to go is a quarter of a mile.

This was doubtless calculated with reference to the distance requisite for stopping a passenger train. The distance necessary to enable a watchman to give a sufficient warning to the workmen would vary according to the time deemed necessary for removing the jack. If we allow ten seconds for this and ten more for a margin of safety, it will be seen that a train running at 60 miles an hour ought to be announced before it got within 1,760 ft. A man  $\frac{1}{4}$  mile (1,320 ft.) away could do this, and with one intermediate man the air line distance through which the signal would have to be given would be only about 600 ft.

Obviously there are many cases where the practical course would be to postpone the work until there was very little likelihood of detaining trains, and then post a regular flagman with torpedoes. As we have just said, the sense of hearing could often be depended upon on a single track road, and the necessity of this rigid method of guarding comes in only where, as at Quincy, the noise from a passing train or from some other source may make dependence upon the ear impracticable. Again, there are situations on double track roads where the liability to distraction by noise is so small that the best way would be to depend upon the ear but to take off the jack during the continuance of the noise. These considerations may possibly be regarded as too largely speculative and of such a nature that they ought to be superseded by some simple rule; but it will be admitted that section masters have to give thought to these matters, and if they are necessary with them, they are not beneath the notice of their superiors; and if proper for their superiors they deserve the attention of state railroad officials. The general use of track jacks without accident indicates that the rule laid down by the Commissioners requires too much; and this practical immunity can have been secured only by general vigilance on the part of section masters on the lines we have sketched.

It may be claimed that we have simply reversed the procedure under the flagging rule, without practically changing it; that the sentinel should be a flagman strictly according to the rule, that he should notify the section master on the approach of a train, and that the latter should then instruct him to take up his torpedoes and hide his flag. But aside from the cumbersome of this rule and the waste of time involved, it should be remembered that it would be very difficult to enforce it. An essential point in the formulation of any code of rules is to include nothing that cannot, at least with ordinary certainty, be enforced. The second recommendation of the Commissioners, that men should clear the track in season to let engineers see a clear rail, deserves to be heeded. A great many section masters are thoughtless on this point, and as we remarked Sept. 5, Welch's conduct would have been highly reprehensible if he had had no jack at all.

#### Railroads in India.

Of all the railroad statistics of the world, perhaps none are more remarkable than those of British India, and none are in better shape for comparison with those of our own country.

The mileage at the end of March, 1889, was 15,245; 860 miles were added during the year 1889-90; "minor corrections" reduce the total to 16,095 at the end of March, 1890. A little more than 1,000 miles are the property of native states; of the remainder, 5,000 miles are owned and worked by the state, 6,000 miles owned by the state but worked by companies, and not quite 4,000 miles owned by companies, either "guaranteed" or "assisted." The financial results to the state are not favorable. The net deficit below fixed charges for 1888-9 was as follows, counting the rupee at 40 cents:

Guaranteed railways.....	\$3,513,000
Operated by companies.....	1,689,000
State commercial railways....	1,294,000
State military railways.....	1,864,000
	\$8,360,000

It is believed that the net showing for 1889-90 will turn out to be \$2,000,000 better than this.

The average cost per mile of line open is 125,000 rupees, or, at present prices of silver, barely \$50,000. But most of the capital was borrowed at higher prices for silver, so that the effective capitalization is much larger—expressed as it is in pounds sterling at old ratios between gold and silver.

About 1,000 miles of line is double track, nearly all of this being operated by companies. About 9,500 miles is of the Indian "standard" gauge of 5 ft. 6 in.; most of the rest is 3 ft. 3 in.

Statistics of equipment are as follows:

	Total.	Per 100 miles.
Locomotives.....	3,662	23
Passenger cars.....	9,940	62
Freight cars.....	46,065	288

The corresponding figures per 100 miles of line in the United States are: Locomotives, 19; passenger cars, 17; freight cars, 557.

Automatic brakes and safety couplers are a thing of the future in India. In fact a good part of the rolling stock is said to have couplings "at only one end"—a rather remarkable state of things if taken literally.

Figures of traffic are as follows:

Passengers carried.....	110,650,000
Passenger mileage.....	4,677,000,000
Passenger train mileage.....	20,600,000
Passenger earnings.....	\$27,600,000
Tons carried.....	22,249,000
Ton mileage.....	3,644,000,000
Freight train mileage.....	30,600,000
Freight earnings.....	\$52,100,000
Average receipts per passenger mile, cents.....	0.59
Average receipts per ton mile, cents.....	1.43

Both the average passenger journey and average freight haul are very long, the former being 43 miles against 24 in the United States, and the latter 165 miles against 111 in the United States. The average freight train load is rather less than ours, being only 124 tons (of 2,240 pounds each) against 158 (short) tons. But the average passenger train load is enormous—228 against 43 in the United States, or more than five times as many. The result is that on a fare of less than six-tenths of a cent a mile the train-mile receipts are decidedly higher than in our own country. Low as are these receipts, the cost of doing the business is yet more remarkably low. The total expense constitutes only one-half of the gross earnings; and on some of the lines the proportion is vastly more favorable. On the East Indian Railway the cost to the company per passenger mile is one-sixth of a cent.

For the present, at any rate, the fears of Indian competition in the wheat traffic seem to be exaggerated. The figures for all grains in the last four years are as follows:

	Tons.
1886.....	4,086,000
1887.....	3,972,000
1888.....	4,327,000
1889.....	4,087,000

Considering the development of railroad mileage during the period in question, this is by no means an advance. It is the coal and merchandise, rather than the grain traffic, which is making rapid progress.

As an indication of the comparative efficiency of labor, it is interesting to note that there are 238,000 railroad employes in India, against 704,000 in the United States; exactly one-third the number of employes, while the mileage and traffic are only one-tenth. It is also interesting to note that, in spite of the growth of the Indian system, the number of employes is slightly less than it was a year ago, owing to the introduction of a few more Europeans into the service; one European being apparently equal to a vast number of natives.

#### The New Standard Gauge Line to Utah.

The opening of a new transcontinental route through Colorado and Utah, via the Colorado Midland, Denver & Rio Grande and Rio Grande Western, last week, is an important event in the railroad history of the year. The extension of the Atchison, Topeka & Santa Fé, Rock Island, Burlington and the Missouri Pacific, to Denver, all within a few years, made it inevitable that some new outlet be secured beyond that point. Of the two lines west of the meridian of Denver, the Colorado Midland was standard gauge, but it ended at New Castle and had no western connection. Two narrow gauge lines, the Denver & Rio Grande and Rio Grande Western, gave a connection with the Central Pacific at Ogden, but this route was not a factor except in passenger matters. Practically all freight between Salt Lake City and Denver has gone by way of the Union Pacific line through Wyoming. The present through freight traffic over the Central and Union Pacific between San Francisco and Denver may not be very large, but it is, no doubt, increasing, and is worth fighting for. The competitors of the Union Pacific and Chicago & Northwestern have not turned over their business at Denver to the former line with the best of grace, and the opening of the new route will be welcome to them, and they will readily give it all freight not routed via the Union Pacific. The Denver & Rio Grande takes westbound freight at Pueblo and Denver, and the Colorado Midland takes it at Colorado Springs, so that transfers will be far more convenient than when all freight had to be hauled to Denver, which the Burlington alone of the newer lines, reaches over its own track.

The Atchison's purchase of the Colorado Midland may lose that line part of the traffic which it would have secured if it had continued independent; but such a loss will very likely be more than balanced by the entire Atchison business, which will, of course, go over its line instead of the Denver & Rio Grande.

We have said that the extension of the Western trunk lines to Denver, Colorado Springs and Pueblo meant also the establishment of through standard gauge lines to



Salt Lake City. The reorganization of the Denver & Rio Grande Western as the Rio Grande Western in June, 1889, undoubtedly hastened the work. That road then proposed to standard gauge its main line from Salt Lake City to the Colorado state line, and to close the gap between the end of its line and the Colorado Midland at New Castle, and it was financially well prepared for the work. The latter part of the project was dropped when the Colorado Midland and Denver & Rio Grande made an agreement in August, 1889, to build jointly the gap of 65 miles to Grand Junction, near the state line. The competition between these two latter lines had reduced rates to very low figures for mountain roads, but it was now agreed that no further reductions should be made.

The new line is about 625 miles long, viz., over the Colorado Midland from Colorado Springs to Newcastle, 233 miles; thence over the Rio Grande Junction road to Grand Junction, 64 miles, and over the Rio Grande Western to Salt Lake City and Ogden, 328 miles. By the Denver & Rio Grande from Denver Springs to Glenwood, 371 miles, the line is 700 miles long. The distance by the Union Pacific from Denver to Ogden is 620 miles, which gives that line a good advantage in mileage.

The cost of the work to the three lines is not yet definitely known. The Denver & Rio Grande has issued \$7,500,000 five per cent. improvement bonds to pay for the changes on its line. The Rio Grande Western has spent over \$5,000,000. The capital stock of the Rio Grande Junction is \$2,000,000 of stock and the bonds are guaranteed by the lessee roads.

The chief interest and importance of the new route for some time will be its effect on passenger travel between Denver and Salt Lake and the Pacific Coast. The three roads interested have made large expenditures in new equipment to attract travel. Very handsome cars have been built, and through trains were put on last Sunday. Two solid trains will be run each way daily between Denver and Ogden, over both the Colorado Midland and Denver & Rio Grande to Grand Junction, and thence over the Rio Grande Junction and Rio Grande Western. Pullman sleeping and tourist cars will be attached to each train to and from San Francisco. The Denver & Rio Grande will have two routes between Salida and Grand Junction, as it will continue to run daily trains over the narrow gauge line via Gunnison and Montrose.

The Chicago & Northwestern Railway Company has been working very diligently for the benefit of the public for the last few years, but, so far, the company itself has not shared in the benefit which its additional expenditure of capital and larger amount of work done have produced. From its fiscal year ending with May, 1887, to that ending with last May, three years, it has made expenditures for additions to road and rolling stock and for improvements which have cost \$5,035,000. Only 149 miles of road were added, but the number of locomotives and of passenger train cars was increased one-tenth, and the number of freight cars one-sixth. The additional expenditures evidently provided accommodations which the public required, for in these three years the whole traffic increased nearly one-seventh, the passenger traffic 13.7 per cent., and the freight traffic 14 per cent.; and in carrying its traffic the company has had to add \$2,035,000 to its working expenses. The interest on the addition to the cost of the property at 5 per cent. is \$250,000, making the cost to the company for the additional traffic and accommodations afforded the public and used by it \$2,285,000. But the increase in the company's earnings meanwhile was only \$863,500, and the company's net earnings, therefore, were \$1,421,500 less than 1886-87, which, to take a short-sighted view of it, indicates that the company has spent five millions of capital and incurred an annual fixed charge of a quarter of a million without any benefit whatever. The railroad man need not be told that the loss would have been much greater had this capital not been expended, and that the shareholders gained, therefore, to the extent that the new capital defended the old; an extremely painful but frequently indispensable process, which others than railroad proprietors sometimes have to submit to. But the public which the railroad serves should not let such facts pass without notice. It has wanted more railroad service and it has got it, and the railroad company has provided the means of giving it and paid the cost of carrying it on, not only without gain, but with a very considerable loss to itself. This is only one instance of many that have occurred in a vast territory west of Chicago recently; and altogether they have resulted in an enormous reduction of the average interest paid by that part of the country on the capital invested in its railroads.

The experience has been somewhat similar in the country at large. The entire railroad system in the three years from 1886 to 1889, according to the statistics of "Poor's Manual," increased 22 per cent. in mileage and 18.6 per cent. in capital. The increase in debt alone, excluding stock, was \$1,022,500,000. The gross earnings, it is true, increased 21 per cent. meanwhile, but the net earnings only 7½ per cent. And for the 1,023 millions of additional debt (not to speak of 495 millions of additional stock), there was an additional profit of only \$21,633,000—a little more than 2 per cent. on the additional debt. The traffic grew fast enough to keep up the income, the

passenger business having increased 20½ per cent., and the freight traffic nearly 30 per cent.; but freight rates fell so much as to make a difference of no less than \$45,276,000 in the net earnings of the last year, and there was also a small reduction in passenger rates. How important this reduction has been to the proprietors of the railroads may be estimated by the fact that the aggregate dividends last year amounted to only about \$138,000,000, so that one-third more could have been paid had freight rates remained as high as in 1886.

Mr. Jay Gould always gives the interviewers something interesting and readable, if he gives them anything whatever (which he generally doesn't), and he certainly keeps well posted on railroad affairs. The following, however, which he did not wait to be asked for, but which is taken from a letter, with his name attached, printed in the New York Sun, and addressed to the editor, is a trifle bold even for one whose horizon embraces a whole continent of railroads. Mr. Gould says:

"I estimate the total number of tons moved one mile annually by this group of roads [the Western and Southwestern systems] to be 16,000,000,000. The auditor of one of these roads has furnished me a statement showing the difference between the rates under the 'Presidents' Agreement' and the present rates, which amounts to a decrease of 1.4 mills per ton per mile. Applying this difference of 1.4 mills to the 16,000,000,000 gross annual tons one mile gives the startling figure of \$22,400,000 annual decrease in the net earnings of this system of roads, as between their operation under the 'Presidents' Agreement' and the loose methods now prevailing. Under this condition of things it is hoped that the banks can be induced to call the presidents together again, with the assurance that they have the whole mass of investors behind them."

Without stopping to inquire whether the whole of the problematical gain in gross earnings could be wholly given to net earnings, one may be pardoned for asking how this 16 billions is made up. The Southwestern group, as classified in Poor's Manual, carried in the last year reported 5½ billion ton miles. If we add to this the ton miles of the Northwestern group (4½ billions) and those of the Pacific group (2 billions) we have 12,227,500,000 ton miles for a year. A considerable share of this certainly ought to be excluded, but to make up for what may properly be included by Mr. Gould, but is not shown in Poor's grouping, we may allow the whole, and still fall short about 25 per cent.

The well-known fact is, however, that the rate troubles are substantially confined to the 500-mile lines radiating from Chicago, and their nearest competitors, and that an appreciable share of the traffic on these is not affected by rate wars. Let us glance at the competitive business of these roads. The present "pool" took cognizance, in October, of 12,835 cars from the Missouri River. Estimating 15 tons a car, and 500 miles for each shipment (Kansas City to Chicago), we have here 1,155,120,000 ton miles per year, which, if we do not go too deeply into particulars, may be regarded as the volume of traffic which ought to be charged higher rates. October is a heavy month and the yearly total is doubtless much less than a billion ton miles.

If we add to this the probable competitive traffic of the Northwestern lines, increasing the total say 80 per cent., we still find the loss to be only about \$3,000,000 as compared with the "startling figure," \$22,400,000, given in the letter quoted from above. Three millions is sufficiently startling, and we have no desire to underrate the gravity of the situation; but statements containing groups of nine ciphers, if believed at all, are believed implicitly by most readers, and the deceptiveness of a statement like that here criticised is therefore the more reprehensible, especially when coming from a source which generally makes no mistakes in its statistics. Even accurate statistics are often exceedingly deceptive, and people will, of course, be chary about crediting the deductions made from them by men or newspapers noted for their juggling practices. If some one will explain how a presidents' agreement can be made to successfully divide one or two apples among a half dozen hungry boys and give each boy a whole one, he will receive instant attention, even if he cannot show a single item from the auditor's statistics. Mr. Gould calls attention to the fact that since the presidents' agreement has existed, each road looking out for itself. The trouble is that every road has a persistent habit of constantly looking out for itself. In the autumn when traffic is plenty they can do this while still smiling on their neighbors; but when it comes to a fight for life the smiles drop off like masks.

Sunday last was, in the latitude of New York City, the gem of the season, one of nature's rarest jewels. The skies were 15.5 per cent. bluer than they ever were before, even in June; the air was balmy, and the sunshine bathed churchgoers in gold to such a lavish degree that the troubles of Wall street and its hypothetical money were forgotten. The ladies' tailors exhibited their latest triumphs, and even dudes for the time being bore a respectable appearance. In keeping with this gloriousness the morning newspapers of that date strove to outdo all previous efforts and, so far as the railroad columns are concerned, nearly succeeded. The Associated Press Champion of the Northwest, having in some way got an inkling of the probable demands of the reading public on

this rare Indian summer day, proceeded to cool them off by evolving the following:

CHICAGO, Nov. 15.—A dispatch from Spokane Falls, Wash., says: "George Hazzard, of Tacoma, declares that arrangements have been concluded and the capital raised by a syndicate of Russian capitalists and some prominent New York railroad magnates, among whom is mentioned Henry Villard, to build a railroad from Puget Sound to Alaska. It is expected that the line will be surveyed next spring. The company has a capital of \$150,000,000, and it is understood that a line of ferryboats will be put on to carry entire trains across Behring Sea, where they will connect with a Russian railroad across Siberia. The latter part of the project is still uncertain, but a road to Juneau will be begun early in the Spring. Besides the seal fisheries, mines and lumber, it is claimed there are coal banks off the Alaskan coast that are practically inexhaustible."

This item has not been printed before for over three years, and if carefully read will be found very fresh. If we may be pardoned a second-hand joke, we would remind the reader that the projector is not a relative of old Haphazard. It was too bad to keep the operator at Spokane Falls up till 8:15 p. m. to send out this dispatch, and, in view of the general rapidity of Monday morning papers, people would doubtless have consented to another day's delay if they had only been so requested. We had intended to throw cold water on this alleged project as impracticable, but we refrain. If any of our readers doubts its vitality, let him look at those nine ciphers, with a dot just before the last two. For ourselves, we must freely admit that a fund of this size will work wonders. But remembering the proneness of railroad projectors, generally, to depend so largely for their success upon water, and the artificial nourishing qualities they are often able to impart to it, we would respectfully remind these people of the terribly congealing effect of that northern climate upon everything aqueous; and from all past indications the thermometers up there are as hard on financial water as upon the kind that they are more familiar with.

The magnitude and the complicated nature of the grade crossing question is well illustrated by the present situation at Bridgeport, Conn. Bridgeport is a small place compared, for instance, with Buffalo, where the problem of changing the grades of railroads and streets is serious, but where the business involved and the resources of the parties concerned are in some measure adequate to the meeting of the problem; but in the little city of Bridgeport the New York, New Haven & Hartford finds that the abolition of the grade crossings and the laying of a third and fourth main track would cost \$6,000,000. The line of the road extends along the shore of the harbor, or not far from it, for a considerable distance, and the cross streets, which, in some cases, are so short on the seaward side that they would not bear much elevation or depression, are very numerous. Many wharves are involved and there is the grade crossing of the Housatonic Railroad. There is also a drawbridge close by, which would have to be wholly rebuilt. Six millions seems large, even for this extensive scheme, and must include large sums for consequential damages to business interests injured by the change. In view of all these difficulties a prominent director of the company, who is reported as giving the above estimate, announces that a decision has practically been reached to build a new road around the city. This would obviate the necessity of a drawbridge, and the line, including a new passenger station, could be built, it is estimated, for one-fourth the sum named above. The great difference in these estimates indicates that the company purposes swinging the line far enough away from the centre of business to avail itself of comparatively cheap land for its right of way. This will at once arouse those interests which object to the removal of an important station from the business centre of a city, and we may expect to hear of vigorous opposition before the railroad company's scheme is carried out.

"The wires attached to the signals near the depot, which are strung along the side of the track about two feet above the ground and were formerly inclosed by a wooden case, are now uninclosed. The result is that almost every day some one is tripped by the wires and several people have been hurt. One man fell in front of a train and narrowly escaped death."

The above item, clipped from a local newspaper in Massachusetts, refers to the ordinary wire connection for semaphore signals as used in many interlocking plants. Connections of this sort at the Grand Central Station, New York City, were left uncovered when the plant was rebuilt a few months ago. The principal use of the boxing is to keep off snow and ice in winter, and there is no doubt that the care and maintenance of the apparatus require less work without the wooden covering than with it. The fact that the covering has been abolished in Massachusetts, where the winters are more severe than in New York, indicates that the trouble from the sources mentioned is not very serious. It must be said, however, that the danger to pedestrians, which in this case was evidently experienced by passengers or other outsiders, needs to be recognized in a yard, where no one but employes are likely to be bothered, as well as at a passenger station. The numerous lawsuits which railroads have had and continue to have, concerning obstacles encountered by yard men in performance of their duties, should be a sufficient warning against introducing any unnecessary complication or risk. If an employe stumbles over a wire in the night and hurts himself his lawyer will very quickly fix up a plausible argument showing negligence on the part of



the company. Boxes as well as wires afford sufficiently vexatious stumbling blocks, especially when painted a neutral color. They should always contrast with the surroundings whenever they are located where they must be stepped over.

The customers of the New York elevated roads, who have been for a long time demanding that smoking cars be run on the trains, have apparently received a final answer from General Manager Hain, who says that the protests from non-smokers against what little lawless smoking is already done are numerous and forcible. The most immediate practical objection to the use of smoking cars is found, however, in the reduction of the maximum train load which would necessarily result, and this has been very clearly illustrated on the Kings County elevated road of Brooklyn, which has been running smoking cars on its trains for several weeks. It has happened every day, when there was a rush of passengers, that people would be standing in the ordinary cars while seats were vacant in the smoking car. If a car were divided and only a portion of it allotted to smokers, the difficulty would be changed but not removed. Until it becomes possible to know beforehand in what proportions the different passengers will apply for passage on each train, the maximum service can be had from a certain number of seats only by using them all under the same conditions. Those familiar with certain city railroads in Europe, where trains are made up to afford accommodations for six different classes (first, second and third for non-smokers, and first, second and third for smokers), need not be told of the impracticability of attempting to carry out this idea with economy. Until the New York elevated roads can run many more trains than they now run, which will be impossible until more tracks are provided, there is no reason in demanding a multiplication of classes.

Railroad Commissioner Rich, of Michigan, has issued a circular to general managers calling their attention to the fact that the law requires automatic couplers on all cars in that state after Jan. 1 next. He recognizes the impossibility of compliance with the law, and intimates that the penalty for non-compliance, which can be enforced only on his motion, will not be unreasonably applied; but in reference to cars equipped with dead woods which extend both above and below the drawhead he asks an immediate response, with a view to taking prompt action toward abolishing this particular source of danger.

#### LOCOMOTIVE BUILDING.

The order of the Rogers Locomotive Works from the Chicago, Burlington & Quincy is for 30 locomotives, and an option is given for 40 more. The Baldwin Locomotive Works are said to have a duplicate order from the same road.

The Nashville, Chattanooga & St. Louis has received the first of a lot of 21 consolidation engines recently ordered.

The Baldwin Locomotive Works have shipped a number of the switching engines ordered by the Union Pacific for use at Denver, and the order will be completed shortly.

#### CAR BUILDING.

The new Delaware, Lackawanna & Western car shop at East Buffalo, N. Y., is busy on an order for box cars.

The Dunkirk, Allegheny Valley & Pittsburgh has received a consignment of 100 new box cars and ten passenger cars ordered recently.

The Savannah & Western has within the past month received 25 passenger cars. The handsomest are equipped with gas lights and air signals.

The St. Louis, Vandalia & Terre Haute has received five new dining cars from the Pullman Car Co.

Twenty-five passenger cars will be added to the equipment of the Pittsburgh, Cincinnati, Chicago & St. Louis. Fifteen cars have been received and are already in service. They are equipped with the Carburetor lights. The Barney & Smith Mfg. Co., of Dayton, O., are the builders.

The first of the 14 new first-class passenger coaches built by the Pullman Car Co. for the East Tennessee, Virginia & Georgia road, arrived in Atlanta.

Matthew Henning, Receiver of the Indianapolis Car & Mfg. Co., has been authorized to sell the plant at private sale, and if not successful to offer it at public auction.

#### BRIDGE BUILDING.

Albany, Ga.—An iron bridge is to span the Kinchafoonee Creek, about two miles north of Albany. This is to be placed there by the Central of Georgia to take the place of the wooden structure.

Alton, Ill.—The local papers state that for several weeks past surveys have been engaged in and about Alton running lines and sounding the river, and it is believed that they are employed by the Chicago, Burlington & Quincy, and are surveying for bridges across the Mississippi and Missouri Rivers.

Birmingham, Ala.—The city council has granted a charter to the North Birmingham Railroad Co. to build a bridge on Twenty-sixth street across Eighth, Ninth and Tenth avenues. The bridge will be 1,550 ft. long. At the highest point it will be 21 ft. above the city grade. It will be 33 ft. wide. There will be a roadway for the railroad line 10 ft. wide, on a carriage way 16½ ft. wide and a foot way 4 ft. wide. It will be built of wood, and cost about \$20,000.

Denison, Tex.—The Missouri, Kansas & Texas is having a new iron bridge built across the Blue River in the Choctaw nation, 28 miles north of Denison.

Easton, Md.—The County Commissioners of Talbot and Caroline counties will build a bridge across Tuckahoe River.

Glasgow, Va.—The Glenwood Land Co. is reported as having let the contract for the construction of a bridge across James River to connect its lands with Glasgow.

Mount Holly, N. J.—The Board of Chosen Freeholders have decided to erect an iron bridge over the Mullica River, between Burlington and Atlantic counties, at a cost of about \$15,000.

Philadelphia, Pa.—The Director of Public Works opened bids this week for the construction of the western approach to the Walnut street bridge. Bids were opened for this work on Oct. 27, when the award was made to the Edgemoor Iron Works for \$38,885. The next lowest bid at that time was \$208,698, by A. & P. Roberts. The Edgemoor Co. explained that an error had been made by which the company's bids had been transposed and the amount placed opposite the tender for the western approach should have been for the eastern end, as they bid \$220,989 for the latter, when other bids were only about what their bid for the western end was. The other bids were: Levering & Garrigues, \$203,400; A. & P. Roberts, \$203,402; this firm bid in October \$208,698, and the Pottsville Bridge Co., \$199,725, the latter company securing the award.

An ordinance to permit the construction of a bridge connecting the Chestnut and Walnut streets bridges has been introduced in the Councils.

St. Louis.—Plans have been prepared by Carl Gaylor, Bridge Engineer of the Street Department, for a new bridge across the Mill Creek Valley at Twelfth street which will cost about \$250,000. No appropriation for the structure has been made.

St. Louis, Mo.—Work on the bridge now being built by the Pacific Short Line across the Missouri River is progressing very well. Sooy Smith & Co., subcontractors for the substructure on the eastern side, have the caisson for pier No. 3 ready to put in. The sinking will be commenced next week and go on as rapidly as possible on the Nebraska side. The low water mattress is in a good portion of the upper bank mattress. The stone for the pier is coming daily from the limestone quarries at Phoenix, Mo.

Topeka, Kan.—Shawnee County has voted bonds to the amount of \$75,000 for a new suspension bridge over the Kansas River at Topeka. The contract has not been awarded yet, but plans have been prepared by Johnson & Fladd, of St. Louis. The bridge is to consist of two spans 470 ft. each from centre to centre of piers. The roadway is to be 20 ft. wide, with a sidewalk on the outside 6 ft. wide. The bridge is designed to carry 100 lbs. to the square foot over the entire roadway and 50 lbs. per square foot on the sidewalk.

Toronto, Ont.—The City Engineer has completed the plans for the proposed high level bridge over the Don at King street, and it is probable that proposals will soon be asked.

Utica, N. Y.—A petition is being circulated requesting the common council to authorize the City Engineer to draft plans for a new bridge across the canal on Genesee street. It also requests the state legislature to authorize the erection of such a bridge.

West Chester, Pa.—The juries, representing Chester and Lancaster counties, have agreed to the erection of an inter-county bridge to span the Octorara at Harkins' Ford, a point between Lower Oxford and Little Britain townships. The structure is to be 100 ft. in length.

Wood County, W. Va.—The County Commissioners of Wood County have advertised for bids for a 100-ft. highway bridge with stone piers and abutments and steel superstructure, 40 ft. wide.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

The Supreme Court of the United States decides that the Minnesota act of 1887, creating a railroad and warehouse commission, providing that all charges for transportation by common carriers "shall be equal and reasonable," and empowering the commission, in section 8, on its finding that any part of the schedule of charges of a common carrier is unequal or unreasonable, to compel such carrier to change the same and adopt such charges as the commission "shall declare to be equal and reasonable," without providing for any hearing before the commission, is unconstitutional, as depriving carriers of their property without due process of law, in so far as it makes the decision of the commission, as to what are equal and reasonable charges, final and conclusive.<sup>1</sup>

In Michigan, the Supreme Court holds that the State Law of 1889, providing that "in cases where a railroad is immediately adjacent to or laid upon a highway,

open, unobstructed residence crossings suitably guarded, substantially as are provided for highway and street crossings, shall be provided and maintained by the railroad corporation operating said railroad; provided, the same shall be so ordered by the railroad commissioner," is unconstitutional. In so far as it authorizes the taking of the property of a railroad company for public use, without compensation.<sup>2</sup>

In Washington the Supreme Court rules that while the state statute providing that the value of stock killed on a railroad shall be assessed by appraisers, and the amount thereupon become due and payable, are unconstitutional as denying the right of trial by jury, sections 1 and 8 making railroads liable for all stock killed on their tracks unless they are fenced are not so connected with the rest of the act as to fall therewith, and are valid.<sup>3</sup>

In Rhode Island the Supreme Court rules that where an act incorporating a street railroad company provides that the "tracks or road shall be operated and used by said corporation with steam, horse or other power, as the city council may from time to time direct," the city may, after notice has been given, and an ordinance passed permitting the use of horse power, pass a second ordinance without further notice, changing the power to electricity. The power conferred on the city council to authorize the use of electricity as a motive power carries with it the power to authorize the erection of poles on the edge of the sidewalk, notwithstanding the act of incorporation provides that "said corporation shall not incur any portion of the streets occupied by said tracks;" such poles not being an incumbrance, but a necessity for the successful operation of the road.<sup>4</sup>

In Kansas it is held by the Supreme Court that where an employé and resident of Kansas performs labor there for a railroad company, a corporation of another state,

but also doing business in Kansas, and the wages of such employé are exempt in both states, in an action by the employé to recover such wages in Kansas, the fact that the corporation has been garnished in such other state by a creditor of such employé before the bringing of this action in Kansas, and service of summons obtained upon the employé only by publication, is no defence to such action.<sup>5</sup>

In the Federal Court it is held that a consolidation of two railroad companies under the Missouri consolidation act of March 2, 1889, operates as the creation of a new corporation, wholly distinct from the constituent corporations out of which it is formed, which new corporation derives its powers and franchises from the consolidation act; and since Const. Mo. 1865, art. 11, § 16, prohibiting legislative exemption from taxation, was adopted before the passage of the act, the consolidated corporation does not acquire the immunity from taxation granted in 1857 to one of its constituent corporation.<sup>6</sup>

In the Supreme Court of the United States it is held that a statute of Missouri, empowering counties to "subscribe to the stock" of a railroad company; to "invest funds" of the county in such stock; to "issue the bonds of such county to raise funds to pay the stock" subscribed; and providing that "any incorporated city or town . . . may subscribe to the stock" of such company—does not authorize an incorporated town to issue its negotiable bonds in payment of the stock.<sup>7</sup>

In Georgia the Supreme Court rules that a temporary injunction will be modified so as to allow a railroad company to complete over its own land a side track already commenced, and to use the same until a final adjudication of the cause; this side track not touching any property of the complainants, and its construction and use being more likely to lessen than increase their annoyance or damage for the present.<sup>8</sup>

##### Injuries to Passengers, Employees and Strangers.

In Wisconsin the accident occurred while plaintiff's five-year old child, in company with a woman, was walking on a railroad bridge within the city limits. The train was running over 25 mile an hour, the rate prescribed by statute being 6 miles an hour. The engineer actually saw the persons on the bridge when 965 feet from them. He could have stopped the train within 700 feet, had it been running 6 miles an hour. The persons were visible to the engineer when 1,200 feet from them, and he could have stopped the train within 1,000 feet at the rate it was then running. The Supreme Court held the railroad liable.<sup>9</sup>

In Texas the Supreme Court holds that deafness of one about to cross a railroad track imposes on him increased vigilance in the use of his eyesight, and those operating a train may, in the absence of knowledge, and of any fact that would arouse their suspicions, assume, on seeing him, that he is in the possession of all his senses and using them for his own safety.<sup>10</sup>

In Arkansas it is held by the Supreme Court that a person employed by a railroad company to clear off and burn the rubbish from its right of way at so much per mile, who hires, pays and controls his own help, is not a servant of the company, but an independent contractor.<sup>11</sup>

In New York while a car-repairer was repairing a car on a side track, a car ran against the cars where plaintiff was at work, causing the bumpers to come together, and crushing plaintiff's arm. The Court of Appeals rules that the fact that plaintiff had hold of the bumper with one hand so as to support himself while working with the other was not negligence, as matter of law, plaintiff's signal flag having been properly posted at the time.<sup>12</sup>

In Massachusetts an employé while employed as conductor of a switching crew in defendant's yard was killed in attempting to couple two cars, by being struck by a piece of timber projecting beyond the end of the moving car, the cars being loaded and handled in the usual way, and the deceased being experienced in his business, and knowing the usages of the yard. The Supreme Judicial Court rules that the railroad is not responsible.<sup>13</sup>

In Illinois the Supreme Court holds that a servant may rely upon his master furnishing safe machinery, and, in the absence of notice, is under no primary obligation to investigate and test it.<sup>14</sup>

- <sup>1</sup> C. M. & St. P. R. Co. v. State, 10 S. C. Rep. 462.
- <sup>2</sup> People v. Detroit, G. H. & M. Ry. Co., 41 N. W. Rep. 934.
- <sup>3</sup> O. R. & N. Co. v. Dacres, 23 Pac. Rep. 415.
- <sup>4</sup> Taggart v. Newport Street Ry. Co., 19 Atl. Rep. 326.
- <sup>5</sup> Missouri Pac. Ry. Co. v. Sharitt, 23 Pac. Rep. 430.
- <sup>6</sup> K. & W. R. Co. v. County Court, 41 Fed. Rep. 305.
- <sup>7</sup> Hill v. City of Memphis, 10 S. C. Rep. 562.
- <sup>8</sup> Savannah, A. & M. Ry. Co. v. Fort (Ga.), 10 S. E. Rep. 1014.
- <sup>9</sup> Hooker v. C. M. & St. P. R. Co., 41 N. W. Rep. 1085.
- <sup>10</sup> Int. & G. N. Ry. Co. v. Garcia, 13 S. W. Rep. 223.
- <sup>11</sup> St. Louis, I. M. & S. Ry. Co. v. Yonley, 13 S. W. Rep. 333.
- <sup>12</sup> Murphy v. N. Y. C. & H. R. R. Co., 23 N. E. Rep. 812.
- <sup>13</sup> Boyle v. N. Y. & N. E. R. Co., 23 N. E. Rep. 827.
- <sup>14</sup> Chicago & E. I. Ry. Co. v. Hines, 23 N. E. Rep. 1021.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Chicago & Eastern Illinois, 6 per cent. on the preferred stock, payable Dec. 22.
- Cincinnati, Sandusky & Cleveland, \$2 per share, payable Dec. 1.
- Cleveland & Pittsburgh, quarterly, 1½ per cent., payable Dec. 1.
- Delaware & Bound Brook, quarterly, 2 per cent., payable Nov. 19.
- North Pennsylvania, quarterly, 2 per cent., payable Nov. 25.

##### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Atlanta & Danville, annual, Portsmouth, Va., Dec. 11.
- Boston & Maine, annual, Boston, Mass., Dec. 6.
- Charlotte, Columbia & Augusta, annual, Columbia, S. C., Dec. 4.
- Columbia & Greenville, annual, Columbia, S. C., Dec. 4.
- Eastern (Mass.), annual, Boston, Mass., Dec. 10.
- East Tennessee, Virginia & Georgia, special, Knoxville, Tenn., Dec. 6.
- Fort Worth & Denver City, annual, Fort Worth, Tex., Dec. 9.
- Georgia Pacific, annual, Birmingham, Ala., Nov. 26.
- Keokuk & Western, annual, Keokuk, Ia., Dec. 4.
- Lehigh & Hudson River, annual, Warwick, N. Y., Dec. 1.



*Marietta & North Georgia*, special, Marietta, Ga., Nov. 25.  
*Middletown & Crawford*, annual, Middletown, N. Y., Dec. 2.  
*New York, Lake Erie & Western*, annual, 21 Cortlandt street, New York City, Nov. 25.  
*New York, New Haven & Hartford*, annual, New Haven, Conn., Dec. 17.  
*Pensacola & Atlantic*, annual, Pensacola, Fla., Nov. 24.  
*Richmond & Danville*, annual, Richmond, Va., Dec. 3.  
*Richmond & West Point Terminal*, annual, Richmond, Va., Dec. 9.  
*South & North Alabama*, annual, Montgomery, Ala., Nov. 29.  
*Virginia Midland*, annual, Alexandria, Va., Dec. 17.  
*Wabash*, special, St. Louis, Mo., Nov. 25.  
*Waukegan Valley*, annual, 5 Vanderbilt avenue, New York City, Dec. 10.

#### Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m. The annual meeting will be held on the third Wednesday in December.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

#### Civil Engineers' Club of Cleveland.

A regular meeting was held Tuesday evening, Nov. 11, 23 members and five visitors present.

James Wallace Kelly and Frank Walter Wilson were elected active members. Mr. John Eisenman reported the action of the Committee at Chicago appointed to formulate plans for an International Congress of Engineers in 1893.

Prof. Harry Fielding Reid, Ph. D., gave a paper on the Muir Glacier. Doctor Reid conducted an exploring party to Alaska this last summer, and he gave a very interesting description of the glacier, which covers an area of 1,000 sq. miles, flows in two opposite directions and has two termini, one at tide water and the other several hundred feet higher. Its lower terminus is about 1½ miles wide and 250 ft. above the water, and extends an unknown depth into the water, which has been sounded to the depth of about 1,000 ft.

From this terminus immense masses of ice are continually breaking off and floating away as icebergs. One most remarkable phenomenon was observed, the existence of a central moraine extending from end to end, moving in opposite directions, and apparently having no beginning. Its like has never before been observed. After much difficulty the velocity of the lower end was found to be 8 or 10 ft. per day, and the upper end probably between 2 and 3 ft. per day. The belief is that the glacier is receding, and to determine this permanent stations have been established, from which observations in the future will be made, and other means will be taken to determine whether or not one part is not what is called a dead glacier.

The ice was observed to have different colors, depend-

ing on the amount of sunlight to which it had been exposed. The glacier has several lateral branches with different names, one of which is the white glacier from the whiteness of its ice.

At the conclusion there was an interesting discussion of a number of the remarkable phenomena observed.

#### Engineering Association of the Southwest.

The Association met in the Young Men's Christian Association building, at Nashville, Tenn., Nov. 13, in annual session.

Prof. Olin H. Landreth called the meeting to order. He stated that the President of the Association, Col. John MacLeod, of Louisville, was ill and would be unable to attend the meeting, and the resident Vice-President was prevented from being present by pressing business. Mr. W. C. Smith was called to the chair.

A report was received from Mr. E. C. Corthell, of Chicago, who represented the society at the meeting of representatives of engineering societies held in Chicago, with reference to holding an International Engineering Congress in Chicago during the World's Fair in 1893. On motion it was decided that this Association take part in the proposed Congress, and Mr. Corthell was chosen as the representative of the society on the General Committee of Arrangements.

The report of Prof. W. L. Dudley, of the committee appointed to prepare a memorial concerning the late Charles L. Jungermann, the first member of the Association to die, was adopted.

The annual reports of the Treasurer, Prof. W. L. Dudley, and of the Secretary, Prof. Olin H. Landreth, were read. The Secretary's report shows a membership of 101, including three associates and seven juniors. The Canvassing Committee reported the election of the following members:

Harry S. Butler, Anniston, Ala., Resident Engineer of the Anniston & Alabama Railroad; Robert H. Young, Louisville, Engineer of the New Albany Belt & Terminal Co.; H. J. Merwin, of Middlesborough, Ky., Engineer for American Association of London; W. G. Kirkpatrick, Nashville, Engineer for Davidson County in building a bridge over Stones River; Thomas P. Branch, Attala, Ala., Division Engineer Nashville, Chattanooga & St. Louis; Samuel P. Cowardin, Florence, Ala., City Engineer; Pierre P. Hurlbut, Chattanooga, Chief Engineer East Tennessee Land and Chattanooga Electric Railroad; Josephus C. Guild, Chattanooga, Assistant State Geologist and General Engineering Practice; Newell Sardus, Chattanooga, President and Manager of the Chattanooga Plow Co.; Nisbet Wingfield, Chattanooga, Superintendent and Engineer of Water-Works; Edward E. Betts, Chattanooga, Assistant Engineer in Chattanooga; J. Rivers Carter, Birmingham, Ala., City Engineer.

The following were elected juniors: Geo. H. Jaques, Chattanooga, with Guild & White; Isaac C. Brewer, Jr., Chattanooga, Resident Engineer, Chattanooga Southern Railroad, and a member of Brewer, Sterling & Co.; Charles E. Bright, Nashville, Resident Engineer East Nashville Land Co.; W. E. Dean, Flat Creek, Tenn., Assistant Engineer Decatur, Chesapeake & New Orleans, also Assistant Engineer Chattanooga Electric Railroad and Kensington Land Co.

The vote for officers for the ensuing year was reported by the Canvassing Committee, and showed the election of the following: President: John B. Atkinson, of Earlinton, Ky.; First Vice-President, W. L. Dudley, Nashville; Second Vice-President, Charles Hermans, Louisville; Secretary, O. H. Landreth, Nashville; Treasurer, W. B. Ross, Nashville.

The directors elected from Tennessee are: W. F. Foster, E. C. Lewis and Hunter McDonald. The directors from other states chosen are: E. L. Corthell, Chicago; John MacLeod, Louisville, and John E. Thacher, Louisville.

The proposed amendment to the constitution, changing the name of the organization to the Engineering Association of the Southwest, was voted on and the letter ballots will be canvassed at the next meeting.

The address prepared by the President, Col. John MacLeod, of Louisville, was read. It was an interesting review of engineering progress during the year, with notes on recent engineering structures and some account of some of the works now in course of construction.

Prof. Landreth called attention to a fine bromotype of the Kentucky River cantilever bridge, completed in 1889, presented to the Association by the chief engineer of the work, Col. MacLeod.

On motion the Committee on Rooms and Library was instructed to procure suitable permanent rooms for the Association. The acquisition of a technical library is contemplated in the future.

The Association decided to hold its next meeting in Birmingham, Ala., on the second Friday in December. Adjourned.

**Engineers' Club of Philadelphia.**  
 A business meeting was held Nov. 1, 1890. President H. W. Spangler in the chair; 21 members present.

The Secretary presented a report from the Committee which had been appointed to represent the Club at the Convention of representatives of the Engineering Societies, held in Chicago, with reference to the part the engineers of this country should take in the coming World's Fair in Chicago. This committee consists of President H. W. Spangler, Chairman, and Messrs. Wilfred Lewis and E. V. d'Inville.

This report was presented to the Board of Directors at their special meeting on Oct. 25, 1890. The following is an abstract from the minutes of the board meeting, and this abstract was also presented by the Secretary:

"The President, at the hands of the Secretary, presented the report of the committee appointed to represent the Club in the matter of the engineers' headquarters, which it is proposed to establish, and the engineers' congress which it is proposed to hold in Chicago during the coming World's Fair. After some discussion, on motion it was ordered that the board transmit this report to the business meeting of the Club, to be held on Nov. 1, with favorable recommendation, but with the understanding that the board recommend that any funds required shall not be taken from the Club treasury, but that circulars be sent to members of the Club, which circulars shall include the said report, and ask for contributions of \$1 from each member of the Club, and special contributions from those members who desire to contribute an extra amount, so that the Club may make a good showing."

On motion, it was ordered that the Secretary be instructed to send a notice to the members of the Club, to the effect that the recommendation of the board was adopted by the Club, with the understanding that the contribution of the Club should be limited to \$500, and that members be invited to each send a contribution of not less than \$1 to this fund.

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#### New England Railroad Club Meeting.

A regular meeting was held Wednesday evening, Nov. 12, 1890. President Richards occupied the chair. The Secretary read a letter addressed to Mr. J. N. Lauder by H. L. Tracey, dated Oct. 7 (received too late to be presented at the October meeting of the Club), announcing the death of Mr. R. N. Allen, President of the Allen Paper Car Wheel Co.

Mr. F. D. Adams, on behalf of the Executive Committee, presented the following resolutions:

"Resolved, That we sympathize sincerely with the widow of Mr. Allen in this event, before which all others fade into insignificance."

"Resolved, That a copy of these resolutions be sent to the widow of the deceased."

On motion the resolutions were adopted by the Club.

The President announced as the subject for discussion at the December meeting, "The Best Form and Application of Brakes to the Driving Wheels of Locomotives," and the subject for the present occasion, "The Economy and Safety of Swing-Motion Trucks as Compared with Rigid Trucks," to be opened by Mr. F. D. Adams, of the Boston & Albany road. This discussion will be found on another page.

#### PERSONAL.

—Mr. F. S. Curtis, Chief Engineer and Roadmaster of the Sinnemahoning Valley road has resigned.

—Mr. Herman I. Miller, who resigned the position of Superintendent of Dining Cars on the Wabash last spring on account of ill health, died recently at his home in Decatur, Ill., of paralysis.

—Mr. R. B. Cable, Superintendent of the Philadelphia & Reading main line, has been granted a two months' leave of absence by the General Superintendent. Mr. M. F. Bonzano, Assistant General Superintendent, will attend to Mr. Cable's duties while he is absent.

—Mr. Frank Hopke, a civil engineer in the service of the New York Central & Hudson River road, died at Hastings, N. Y., on Thursday night, Nov. 13, of typhoid fever. He had been ill but a short time. Mr. Hopke was a graduate of the School of Mines of Columbia College.

—Mr. J. E. Rose, who retired from the position of Superintendent of the Baltimore & Ohio Southwestern road earlier in the month, has been appointed Superintendent of the Cincinnati Division of the Cleveland, Cincinnati, Chicago & Lake Erie, which extends from Cincinnati to Delaware, O.

—Mr. George G. Bywater, Master Mechanic of the Utah division of the Union Pacific, with headquarters in Salt Lake City, has resigned, to take effect Dec. 1. A. C. Hinckley, at present Division Foreman at Green River, Wyo., will succeed him. Mr. Bywater has held the position for many years.

—Mr. J. R. Wentworth, who has been Division Superintendent of the St. Louis & San Francisco, received the appointment of General Superintendent last week. He succeeds Mr. E. C. Merrill, Superintendent of the Chicago & Erie.

—Mr. Charles Schiff is understood to have declined the position of First Vice-President of the Cincinnati Southern, to which position he was elected at the recent annual meeting, at which General Samuel Thomas was elected President. Mr. Schiff will continue President of the Vicksburg, Shreveport & Pacific and the other lines of the "Queen & Crescent" not controlled by the East Tennessee, Virginia & Georgia.

—Mr. W. B. Green, Superintendent of the Montana Central, has been appointed Superintendent of Construction of the Great Northern, in charge of the Pacific Coast extension of that road from Assinaboine. Mr. Green's successor on the Montana Central is Mr. L. E. Johnson, Superintendent of the Chicago Division of the Chicago, Burlington & Quincy, and formerly Superintendent of the St. Louis division of that road.

—Mr. William C. Irwin, Chief Engineer of Maintenance of Way of the Cleveland, Cincinnati, Chicago & St. Louis has resigned, and will retire about Dec. 1. Mr. Irwin has been connected with the old "Bee Line" for 27 years. He entered the service as rodman in 1863, and successively filled the various positions in the engineering department to Assistant Engineer. From 1881 to 1885 he was Engineer of Bridges, and since 1885, Chief Engineer.

—Mr. D. Miller, General Traffic Manager of the St. Louis, Arkansas & Texas, resigned last week, and it is reported that he has accepted a similar position on the Cincinnati, New Orleans & Texas Pacific. Mr. Miller was appointed General Traffic Manager last February when the position was created. He was previously General Freight Agent. Mr. L. P. Day now holds that position, and it is believed that he will have charge of the freight traffic, and that the office of Traffic Manager will be abolished.

—Mr. Daniel Runkle died at Plainfield, N. J., this week, at the age of 67, after an illness of 18 months. He was President of the Warren Foundry & Machine Co., of Phillipsburg, N. J.; President of the firm of Runkle, Smith & Co., at 15 Wall street, New York, chartered nine months ago, to put in water works in Havana, Cuba. The Warren Foundry & Machine Co. was started by Mr. Runkle in 1856, and was made into a stock company in 1860. Mr. Runkle once owned the Keystone Furnace in Pennsylvania.

—Mr. Edward B. Stahlman, Third Vice-President of the Louisville & Nashville, has resigned. He has held the position for the last five years. Mr. Stahlman is a German by birth, but has been in the American railroad service since 1858. He was a superintendent's clerk on the Louisville & Nashville between 1862 and 1865, and again between 1870 and 1882 as Contracting Agent, General Agent, General Freight Agent and Traffic Manager. He was then for a short time General Traffic Manager of the Louisville, New Albany & Chicago.

—Mr. Charles E. Webster, whose appointment as Assistant Chief Engineer of the Lehigh Valley was announced last week, has been Chief Engineer of the Lehigh Valley Branch to Pottsville, Pa., the Schuylkill & Lehigh Valley road. The surveys were made under his direction, and he had charge of its construction. He was formerly Chief Engineer of the Johnsonburg road. Mr. Webster is a member of the Engineers' Society of Western Pennsylvania.

—Mr. Henry D. Minot, formerly President of the Eastern Minnesota road, was killed in the wreck on the Pennsylvania road at New Florence, Pa., Nov. 13. Mr.



Minot was 32 years old and was born in Boston. He graduated from Harvard in 1876 and was engaged in law studies for a few years after he left college. He was also connected with a Boston banking house with his brothers. Mr. Minot, when scarcely 23 years old, made an examination of the Mexican Central and Northern Pacific for Boston capitalists. He also made an expert examination of the St. Paul, Minneapolis & Manitoba in 1884, and on his report large sums were invested in the road. During this visit he seems to have become impressed with the possibilities of investments in the Northwest, for he soon returned and settled in St. Paul. He was elected Vice-President of the Manitoba and later President of the Eastern Minnesota. When this road was merged with the Manitoba last August he resigned. Mr. Minot then went to California and spent some time in San Francisco attending to business interests. Mr. Minot took a leading and active part in founding the town of West Superior, and he devoted a large share of his attention to its development. Mr. Minot had the confidence and respect of all his business associates and he was very popular socially. His death is deeply lamented by all who knew him. It seems to have cut short a most promising career.

#### ELECTIONS AND APPOINTMENTS.

**Alabama Great Southern.**—The directors have elected the following officers: Samuel Thomas, President; Charles Schiff, First Vice-President; Henry Fink, Second Vice-President; L. M. Schwan, Secretary and H. H. Tatem Treasurer. These officers are the same as those elected for the Cincinnati Southern with the exception of Secretary.

**Alabama & Vicksburg.**—The directors of the road met in Cincinnati last week, and elected the following officers: Charles Schiff, President; C. C. Harvey, Vice-President; H. H. Tatem, Secretary and Treasurer.

**Albany, Florida & Northern.**—The following directors were elected at a meeting recently held at Albany, Ga.: Nelson Tift, S. R. Weston, Q. N. Woolfolk, F. F. Putney, G. M. Byne, N. F. Tift, P. C. Bagley and S. H. Hawkins. Nelson Tift was elected President, S. H. Hawkins Vice-President, and W. E. Mitchell Secretary and Treasurer.

**Atchison, Topeka & Santa Fe.**—The headquarters of the Rio Grande division are to be removed from Wallace to Albuquerque, N. Mex.

**Atlanta & Chattahoochee River.**—C. J. Simmons, W. Asberry Baker, and Thomas Moore, of Atlanta, have applied for a charter in Georgia for this road.

**Baltimore & Ohio.**—The following directors were re-elected by a vote of 128,000 shares out of an aggregate of about 197,000 shares at the annual meeting in Baltimore, Nov. 17: James Sloan, Jr., William F. Burns, Deatur H. Miller, William H. Blackford, Aubrey Pearre, George de B. Keim, Westley A. Tucker, Maurice Gregg, J. Wilcox Brown, William F. Frick, George A. von Lingen and George C. Jenkins.

**Bristol, Elizabethton & North Carolina.**—At a meeting of the directors of the road, at Bristol, Tenn., Nov. 12, the following officers were elected: B. L. Dulaney, President; M. B. Wood, Vice-President; John C. Anderson, Treasurer; B. G. McDowell, Secretary.

**Buffalo, Rochester & Pittsburgh.**—The annual meeting of the stockholders of the road was held at 36 Wall street, New York, Nov. 17. The following were elected Directors: Frederick A. Bell, Wilson S. Bissell, George H. Lewis, of Buffalo; Frederick A. Brown, Walston H. Brown, Adrian Iselin, Jr., Wheeler H. Peckham, Alfred Roosevelt, J. Kennedy Todd, of New York; Arthur G. Yates, of Rochester; Warren A. Wilbur and R. M. Gummere, South Bethlehem, Pa.; Edward N. Gibbs, Norwich, Conn. The number of shares of stock voted was 106,000 out of the total 120,000. The new board elected officers as follows: President, Arthur G. Yates; Vice-President, William H. Baldwin; Auditor and Treasurer, John F. Dinkey, of Rochester; Secretary and Assistant Treasurer, John H. Cocart, of New York.

**Catsaugua & Fonesville.**—At a meeting of the board of directors, recently held, the following officers were elected: A. A. McLeod, President; W. R. Taylor, Secretary, and W. A. Church, Treasurer. The following appointments were announced: L. A. Sweigard, General Superintendent; B. H. Bail, General Freight Agent; C. G. Hancock, General Passenger Agent; and D. Jones, Comptroller.

**Charleston & Savannah.**—The offices of Auditor of Earnings and Auditor of Expenses have been consolidated, and J. E. Smith has been appointed Auditor, to take effect Dec. 1.

**Chicago, Burlington & Quincy.**—H. D. Judson has been appointed Superintendent of the Chicago division, to succeed L. E. Johnson, resigned.

J. W. Hly, Solicitor for the lines of the company in Iowa, has been appointed General Solicitor, vice Wirt Dexter, deceased.

**Chicago & Erie.**—F. E. Merrill, has been appointed Superintendent, with headquarters at Chicago, vice C. L. Mayne, resigned.

**Chicago, Milwaukee & St. Paul.**—W. O. Chase, for many years connected with the Wagner Palace Car Co., latterly as District Superintendent on the Chicago & Northwestern system, has been appointed Superintendent of the sleeping car department of this company.

**Cleveland, Cincinnati, Chicago & St. Louis.**—J. E. Rose has been appointed Superintendent of the Cincinnati Division, with headquarters at Springfield, Ohio. The Columbus Division of the Cincinnati, Sandusky & Cleveland will hereafter be operated in connection with and as a part of the Cincinnati Division.

**Duluth, Pierre & Black Hills.**—The officers of the company are: William S. Wells, President, Pierre, S. D.; B. J. Templeton, Vice-President, Pierre; B. P. Tilden, Chief Engineer, Aberdeen, S. D.; and James A. Ward, General Manager, Sioux Falls, S. D.

**Duluth, Red Wing & Southern.**—At the annual meeting, held at Red Wing, Minn., Nov. 14, the following were elected directors: L. F. Hubbard, G. H. Cray, T. B. Sheldon, S. B. Foote, F. W. Hoyt, Red Wing; J. W. Park, Balsam Lake; C. R. Morse, River Falls; W. C. Rice, St. Paul; W. H. Twiford, Geneva; C. E. Sheldon, M. J. Toher, Owatonna; R. M. Todd and Albert Lea. The former officers were re-elected as follows: President, F. W. Hoyt; Vice-President, S. B. Foote; Secretary, G. H. Cray; Treasurer, T. B. Sheldon, and General Manager, L. F. Hubbard.

**East Tennessee, Virginia & Georgia.**—The annual election of the company occurred in Knoxville, Tenn., Nov. 19, resulting in the election of the following Directors: Samuel Thomas, Calvin S. Brice, John H. Inman, C. M. McGhee, John G. Moore, Thomas M. Logan, John Greenough, William L. Bull, George J. Gould, George Coppel, John H. Hall, W. S. Chisholm, E. J. Sanford, Evan Howell, James Swann. The only change from the personnel of the old board was the election of Mr. Swann in place of George S. Scott.

**Fort Worth & Denver City.**—John F. White has been appointed Master Mechanic of the road, with jurisdiction between Fort Worth and Toline, with headquarters at Fort Worth, Tex.

**Gulf, Colorado & Santa Fe.**—George A. Helm, Superintendent of the Southern division, with headquarters at Temple, Tex., has resigned that position, and will be succeeded by S. S. Morris, Chief Clerk of the late General Superintendent and Chief Engineer, J. H. Scott.

W. A. Frost having resigned as Auditor of this company to accept a similar position with the Mexican Central, W. E. Lufkin has been appointed Acting Auditor, in full charge of the Accounting Department at Galveston, Tex.

S. K. Wheeler has been appointed Superintendent of Transportation of this company, with headquarters at Galveston, Tex.

**Houston Bell.**—The following directors were recently elected at Houston, Tex.: Colonel A. Mardis, W. T. Atkinson and G. W. Hardy, Hutchinson, Kan.; John J. Stevens, San Antonio, Tex.; E. J. Sandmeyer and Dr. R. H. Harrison, Columbus, Tex.; Benjamin P. Morris and Thomas P. Nichols, Galveston, Tex.; and Major R. F. Weems, Houston. The directors elected officers as follows: President, Dr. R. H. Harrison; Vice-President, Col. A. Mardis; Secretary and Treasurer, Maj. B. F. Weems; General Manager, Thomas P. Nichols.

**Illinois Central.**—J. C. Welling, recently appointed First Vice-President, is to have charge of the treasury and accountant department, the land office, and will attend to the payment of taxes. The Treasurer at New Orleans, the Local Treasurer and the Assistant Treasurer at New York, together with the Land Commissioner and Tax Agent, will report to him. Mr. Welling will continue to discharge the duties of Comptroller. Second Vice-President J. T. Harahan will have supervision over the operating and traffic department, and the General Manager and Traffic Manager will report to him.

**Long Island.**—C. R. Fitch, Assistant Superintendent, in addition to his other duties, has been hereby appointed Superintendent of Telegraph. The Train Master and all station agents and operators, with the exception of those heretofore reporting to the Traffic Manager, will report to the Assistant Superintendent.

**Milwaukee & Northern.**—At a special meeting of the road in Milwaukee, Wis., Nov. 18, the resignation of President Alfred Hoyt was accepted and Henry C. Payne, of Milwaukee, was chosen to take his place. Samuel Spencer, of New York, was elected a director in the place of Mr. Hoyt. The other directors are Frank S. Bond, New York; Roswell Miller, H. P. Ripley, Chicago; Frederick Layton, Henry C. Payne and Angus Smith, Milwaukee. Officers: Henry C. Payne, President; E. P. Ripley, Vice-President; P. M. Myers, Secretary, and F. G. Ranney, Treasurer.

**Mississippi & Little Rock.**—The officers of this company are now as follows: President, Zeb Ward, Sr.; Secretary, Geo. R. Brown; Treasurer, Oscar Davis, and Chief Engineer, Jas. A. Martin, all of Little Rock, Ark.

**Missouri, Kansas & Texas.**—Polk Palmer has been appointed Superintendent of the Newark division of the Kansas Pacific, with headquarters at Kansas City, Mo.

**Missouri, River & Bonne Terre.**—At a meeting of the stockholders, held at Bonne Terre, Mo., recently, J. Wyman Jones was elected President; C. B. Parsons, Vice-President; H. N. Camp, Treasurer; J. B. Wilde, Secretary; and J. Burns, Superintendent.

**Montana Central.**—L. E. Johnson has been appointed Superintendent of this division of the Great Northern Line, with headquarters at Helena, Mont., to succeed W. B. Green, resigned.

**New Iberia, Vermillion & Western.**—The officers are: August Erath, President; James A. Lee, Vice-President; E. A. Pharr, Treasurer, and James W. Callahan, Secretary, all of New Iberia, Ga.

**New York & Greenwood Lake.**—B. E. Moodev has been appointed Superintendent of this and the Watchung road, vice J. F. Maguire, transferred.

**New York, Lake Erie & Western.**—J. F. Maguire, Superintendent of the New York & Greenwood Lake and Northern Railroad of New Jersey, has been transferred to be Superintendent of the Western Division, with headquarters at Hornellsville, N. Y. He succeeds his brother, M. W. Maguire, who has been transferred to the Susquehanna Division, at Susquehanna, Pa. B. F. Moody, Chief Train Dispatcher of the Eastern Division, has been promoted to be Superintendent of the New York & Greenwood Lake and Northern Railroad of New Jersey, with headquarters at Jersey City, to succeed J. F. Maguire, transferred. T. M. Pindle, formerly a train dispatcher on the Eastern Division, has been promoted to be Chief Dispatcher to succeed B. F. Moody, promoted.

**Niagara Falls & Lewiston.**—The incorporators have organized by electing the following officers: President, John M. Brinker; Vice-President, Murray A. Verner; Treasurer, Robert W. Jones; Secretary, Alexander White.

**Norfolk & Carolina.**—At the annual meeting of the road held at Norfolk, Va., Nov. 13, the following officers and directors were elected: Warren G. Elliott, President; H. Walters, Wilmington, N. C., Vice-President; W. T. Walters, B. T. Newcomer and W. J. Doyle, Baltimore; Calvin S. Brice, Ohio, and H. C. Fahnestock, New York.

**Pacific Mail Steamship Co.**—At the semi-annual meeting of the company in New York, Nov. 19, Edward Lauterbach, Charles M. McGhee and Oliver H. Payne, who never qualified as a member, retired from the Board of Directors and Jay Gould, George J. Gould and Russel Sage were elected in their places. J. B. Houston, who has been President, was elected Vice-President and General Manager, and George J. Gould was elected President. The other directors are now Calvin S. Brice, Samuel Thomas, C. P. Huntington, Henry Hart, J. B. Houston and Isaac E. Gates.

**Pittsburgh, Columbus & Fort Smith.**—The annual election of the road was held in Pittsburgh, Kan., Nov.

18. Alexander Warner, of Connecticut; D. C. Finn and S. H. Smith, Baxter Springs, Kan.; A. J. Vail and H. F. Kelly, Fort Smith; O. J. Nichols, Cherokee; F. C. Seamon, Columbus; James Palmer and J. W. Brewer, Pittsburg, were elected directors. Col. A. Warner, was elected President; D. C. Finn, Vice-President; James Palmer, Treasurer; and O. J. Nichols, Secretary.

**St. Louis & San Francisco.**—J. R. Wentworth has been appointed General Superintendent, with office at St. Louis, to succeed F. E. Merrill, who has been appointed Superintendent of the Chicago & Erie. L. D. Button, late Superintendent of the Kanawha & Michigan road, will become Superintendent of the Kansas division, with headquarters at Neodesha, Kan., to succeed Mr. Wentworth. W. A. Thomas, Superintendent of the Texas division, with headquarters at Fort Smith, has been transferred to the St. Louis division, vice E. L. Fay, resigned. J. A. Mantor, who has been Freight Agent for the company for the last 12 years at the Seventh street station, St. Louis, Mo., succeeds Mr. Thomas.

**St. Louis, Vandalia & Terre Haute.**—W. F. Brunner, Chief Clerk in the passenger department, has been appointed District Passenger Agent of this line and the Pennsylvania at Indianapolis, Ind.

**Schuylkill & Lehigh.**—The Board of Directors met at Philadelphia, Pa., Nov. 14, and accepted the resignation of President Austin Corbin, electing A. A. McLeod to succeed him. James M. Landis was elected a director to fill the vacancy and Albert Foster was chosen a member of the board to succeed the late Stephen A. Caldwell.

**Silver Creek & Dunkirk.**—The following directors have been elected by this company, referred to last week: W. K. Vanderbilt and H. McK. Twombly, New York; George C. Greene, Buffalo; C. H. Lee, Silver Creek, N. Y.; M. L. Hinman and C. D. Murray, Dunkirk, N. Y.; P. P. Wright, C. P. Leland, G. H. Kimball, O. G. Getzen-Danner, Cleveland, and John Newell, Chicago. The officers elected are: Chairman of Board, W. K. Vanderbilt; President, John Newell; Treasurer, E. D. Worcester; Secretary, C. P. Leland, and Chief Engineer, George H. Kimball.

**Southern Pacific.**—The following changes have been made: The offices of Superintendent of Track, Division Roadmaster and Superintendent of Bridges and Buildings have been abolished, and the office of Engineer of Maintenance of Way created. The latter will, under the control and direction of the General Manager, have charge of maintenance of way structures and the improvements and additions thereto on all operated lines. Division Superintendents will have immediate supervision of all men employed in the Maintenance of Way Department on their respective divisions. Appointments are made as follows: Engineer of Maintenance of Way, W. G. Curtis; Assistant Engineers, J. H. Wallace and Arthur Brown, with headquarters at San Francisco. Resident Engineers are appointed as follows: N. B. Kellogg, first district, headquarters at Oakland; Thomas Fitzgerald, second district, headquarters at Ogden; H. Cooley, third district, headquarters at Dunsmuir; William Grondahl, fourth district, headquarters at Portland, reporting directly to the manager of lines in Oregon; W. C. Ambrose, fifth district, headquarters at Tulare; and H. Hawgood, sixth district, headquarters at Los Angeles.

**Stanstead, Shefford & Chambly.**—The following directors were elected at the annual meeting held at Waterloo, P. Que., Nov. 12: Hon. G. G. Stevens, J. W. Hobart, H. L. Robinson, A. H. Moore, Geo. T. Childs, Hon. J. Gregory Smith, J. A. Coole, D. D. Raullette and E. C. Smith. The following officers were elected: President, Hon. J. J. Stevens; Vice-President, J. J. Coole; and Secretary, J. P. Noyes.

**Ulster & Delaware.**—T. C. Hoornbeek, of Rondout, N. Y., has been made Treasurer of this company, to succeed A. Benson, deceased.

**Union Pacific.**—The Pacific division has been divided into the Oregon and Washington divisions. A. H. Crocker is Superintendent of the Oregon division and W. H. Holcomb is Superintendent of the Washington division. Mr. Holcomb's headquarters will be Tekoa, Wash. Capt. J. W. Troup has been made superintendent of water lines, with headquarters at Portland, Or. Goodall, Perkins & Co., Superintendents of Ocean division, headquarters in San Francisco. C. A. Cameron, supervisor of bridges, headquarters at Pendleton, Or. Robert McClelland, division engineer, and Edward Cockingham, assistant general manager.

**Wheeling & Lake Erie.**—W. D. Sherwood has been appointed Master of Transportation, with headquarters at Toledo, O., vice N. A. Somers, resigned.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Athens Belt.**—This company has been organized to build a short road at Athens, Clarke County, Ga. The capital stock is \$15,000. The incorporators are: Japha R. Rucker, Rufus K. Beaver and Henry H. Linton, of Athens.

**Baltimore & Ohio.**—Negotiations are now pending between the company and the city of Wheeling, W. Va., for the removal of the company's tracks from Sixteenth and Seventeenth streets in that city. The tracks on those streets have been a source of annoyance to the citizens for years, and several efforts have been made by the city to have them removed, but without success. Some weeks ago Vice-President T. M. King of the Baltimore & Ohio arranged with the Council Committee on Railroads that if the city would find for the company another route which would be practicable and not too expensive it would remove its tracks. The City Engineer has been at work since that time and has selected a route along the banks of Wheeling Creek, which will cost the city about \$100,000 to procure. Another joint meeting of the city council and the representatives of the company will be called in a few days to consider the proposition.

**Briarfield, Blocton & Birmingham.**—The Bessemer division of the road between Gurnee and Bessemer, Ala., is rapidly nearing completion. All the grading has been finished and the track laid except for eight miles, which will be put down just as rapidly as possible, and in a short time the entire road will be ready for operation.

**Castle Valley.**—The contracts for grading 20 miles of this road will probably be awarded as soon as the survey has been completed. This is now in progress. The route will be from the junction of Rio Grande Western at Price, in Emery County, Utah, running thence



westerly through Cleveland, Huntington, Lawrence, Castle Dale and Orangeville to coal fields in Cottonwood Cañon, a distance of about 50 miles. About 20 miles has been already graded, but no track is laid. The character of the work to be done is rather easy, with grades not over two per cent. The road will reach a large coal deposit containing besides soft coal for coking, etc., a large vein of cannel coal and other resources, such as mineral wax, asphaltum in large bodies, sulphur, cement, borax, gypsum.

**Cheyenne & Northern.**—The extension of the Union Pacific from Wendover, the present terminus to a connection with the Fremont, Elkhorn & Missouri Valley Railroad at Fisher, Wyo., 35 miles east of Douglas, will be finished Dec. 1. A traffic arrangement has been made giving the company access to the rich oil fields of Wyoming and also to Deadwood and Custer.

**Chicago & Eastern Illinois.**—In right of way suit at Tuscola, Ill., in the County Court, decision has been given in favor of the railroad. This it is believed, ends the right of way disputes on the extension from Tuscola to Shelbyville, Ill., and work on the construction of the line may be commenced in December.

**Chicago, Paxton & Cayuga.**—The Secretary of State of Illinois has issued a charter to this company which is to build a road from Paxton, in Ford County, southeasterly through Vermilion County, to a junction with the Chicago & Eastern Illinois, the Toledo, St. Louis & Kansas City and the Midland Indiana roads, at the village of Cayuga, Ind. The principal office is to be at Chicago, and the capital stock is \$2,000,000. The incorporators and first board of directors are: George W. Cole, C. Porter Johnson, Richard A. Allen, and H. Willett, of Chicago, and Stephen D. Clifton, of Danville.

**Clear Lake & Northern Pacific.**—The locating survey is being made for this road from Clear Lake west to Lakeport, Cal., a distance of about 20 miles. The road will be narrow gauge, and will connect with the San Francisco & North Pacific. Lake County will be asked to subscribe \$40,000. The capital stock is \$250,000.

**Duluth, Pierre & Black Hills.**—The grading will probably be resumed soon between Faulkton and Aberdeen, S. D., and it is proposed to finish it as early in the coming season as the weather will permit. The route is from Oakes, N. D., to Pierre, S. D., via Aberdeen and Faulkton. The road is surveyed for the entire distance, and the right of way has been secured. Forty-four miles of the line between Aberdeen and Faulkton is graded. No track has yet been laid. The maximum grade is 30 ft. per mile and the maximum curves 3 degrees.

**Duluth, Red Lake Falls & Northern.**—The surveyors who have been working on the line between Red Lake Falls and St. Thomas, N. Dak., have completed the preliminary surveys between those points, and have commenced to run a line southeast from Red Lake Falls toward Wright and Duluth, Minn.

**Dutchess County.**—Judge Barnard, of New York, has appointed Robert W. Wilkinson, of Poughkeepsie, Receiver of the road a short line under construction intended to connect Poughkeepsie Bridge with the New York & New England, at Hopewell, N. Y. The road owes John P. Andrews, one of the contractors, \$60,000.

**Fort Worth & Rio Grande.**—Contracts will probably be let at once for the extension of the road from Comanche. The route for the extension has not been fully determined upon, but it will probably be through Mullen, the junction with the Gulf, Colorado & Santa Fe, and San Saba to Llano, a distance of about 94 miles. A close preliminary survey has been run, so that the location can be made at once. If the construction is entered upon now the road will be completed for the spring shipment of young cattle. The grading is a fair average of Texas work, with some few difficult rock divides. The maximum grade is 1½ per cent., and maximum curve four degrees. The steel bridges will have an aggregate length of 640 ft. Financial arrangements have been made for construction and equipment by the same syndicate that has constructed the already completed portion of the road.

**Georgia Pacific.**—The Tallahatchie branch from Itta Bena, on the main line, to Webb's, Miss., 34 miles down the Yazoo delta, was formally opened for business last week. The Tallahatchie branch opens up a rich agricultural district, and there will be a large traffic from cotton.

**Hope & Lewisville.**—This company has been chartered by C. E. Bramble, W. R. Kelley, J. A. Roberts and others to build a road from a point on the St. Louis, Arkansas & Texas at or near New Lewisville to Hope, a distance of 25 miles. The capital stock is \$250,000.

**Houston Belt.**—This road has been recently reorganized, and it is said is prepared to complete the belt line at Houston, Tex. The right of way has been secured except in a few places. The line will encircle the city, crossing the bayou twice, and will be about 15 miles long. Five miles of branches are proposed. The cost of the road is estimated at \$200,000.

**Kankakee Valley & Belt.**—The company has filed articles of incorporation in Illinois. The road is to be constructed from a point near the mouth of the Kankakee River, up the valley of that river, through Wilmington and Custer in Will County, and Saline and Limestone in Kankakee County to Momence, and thence to the eastern boundary line of Illinois. The capital stock is \$7,000,000. The incorporators and first Board of Directors are: J. Pembroke Bishop, Hiram A. Harries, Walter Thomas Mills and Cornelius D. Pain, of Chicago; Camden Knight, of Custer Park, and John D. Smiley, of Custer, Ind.

**Mahoning Valley.**—Work has been commenced on the first two miles of this road from Punxsutawney, Pa., on the Buffalo, Rochester & Pittsburgh, to new mines being opened by Adrian Iselin, Jr., the owner of the road. The survey for the branch to Stanley has been made, and the engineers are now running the line to Clearfield, which is to be the terminus, about 42 miles from Punxsutawney. J. A. Haskell, ex-Treasurer of the Rochester & Pittsburgh Coal & Iron Co., is President of the new line.

**Midland (Indiana).**—An election will be held shortly in Brazil Township, Ind., to vote on a proposed tax of \$29,000, to secure an extension of this road to Brazil from Sand Creek, and the location of the shops.

**Midland Pacific.**—This road is so often referred to in the newspapers as one which is to build some hundreds

of miles of road within a year that it may be well to publish what its projectors think. An officer writes: This is as yet a "paper" railroad, and should not be referred to in any formal way at present. The only thing that has been done with the enterprise is to survey a route from Sioux Falls across part of South Dakota, but the amount of money in the treasury is so small as to preclude any great amount of work for next year.

**Mississippi & Little Rock.**—R. W. Worthen, of Little Rock, Ark., who has the contract for building this road from Duncan west to Little Rock, a distance of about 61 miles, will probably let the contract within a month for laying the track on about 30 miles of the road. Six and a half miles of track has been laid and the crossings and connections with the St. Louis, Arkansas & Texas at Aurich Switch have been completed. Thirty-five miles of right of way has been cleared, and nearly that amount of grading has been completed. The bridges on the road are completed and certified to by the engineer for 17 miles, and the piling driven for 32 miles. All this work has been done west of White River and east of Little Rock. After the road is completed to Little Rock from White River there will be a 700-ft. pivot iron bridge over White River to be erected and a couple of miles of trestles at White River. There are no towns of any importance along the line from Duncan to Little Rock. The final location of the road has been made with the exception of perhaps a few small changes which may probably be necessary on the east 16 miles on the line. The contractor is building and equipping the road for six per cent. 30 year bonds, and he has made arrangements to borrow sufficient money on these bonds to build the road.

**Minneapolis, St. Paul, Sault Ste. Marie & Atlantic.**—The grading on the branch through Dickey County, S. Dak., has been suspended on account of the cold weather. The grading has been finished from Boynton, the present terminus, for about 12 miles to the Côteaus. The branch is to be built to a connection with the line to Bismarck, between the counties of Logan and McIntosh. It is expected that both the line from Aberdeen to Bismarck, and that from Harkinson to Jamestown, will be completed next year.

**Mobile & Girard.**—At a meeting of the directors of the company in Columbus, Ga., last week it was voted to issue bonds to the amount of \$12,600 per mile for the extension from Troy, Ala., to Pollard or Brewton, the total issue not to exceed \$4,000,000. A meeting of the stockholders will be held in Girard, Ala., Nov. 22, to ratify the action of the directors.

**Nashville, Chattanooga & St. Louis.**—The contractors have begun to lay track at Littleton, Ala., on the Tennessee & Coosa division. The large cut at this point on which the contractors have been at work for some weeks has been finished and the track can now be laid across the mountain.

**New Iberia, Vermillion & Western.**—The survey for this road will begin in a few days from New Iberia to Abbeville, La., and thence west for a distance of about 22 miles. An election will be soon held in New Iberia to vote a five-mile tax for 10 years, which is expected to amount to a subsidy of \$50,000. If the election is carried the company will be prepared to correspond with contractors. The road will be through a level country, and not expensive to build. It connects with the Southern Pacific at New Iberia.

**New Roads.**—When the Virginia legislature convenes a charter of incorporation will be asked for by a company to construct a road from a point in Middlesex County through Caroline, King and Queen and Middlesex Counties to the coal fields of West Virginia.

**Norfolk & Western.**—The surveys have been completed for the branch through Logan County, W. Va., from the head of Twelve Pole River up to Logan Court House and from there up Guyandotte River to Bramwell, in Mercer County. The line is definitely located and will be ready for work in a short time.

**Northern Indiana.**—The survey is being made from New Buffalo west to Michigan City, Ind., and the engineers are now examining the routes for crossing the harbor at the latter town. The survey will be continued to Hammond, Ind., near Chicago. The road is an extension of the Chicago & West Michigan.

**Oregonian.**—About 400 tons of 6½ lb. rails have lately arrived at Portland, Or., for this road, and 1,000 tons are expected this month. The rails will be used on the extensions from Coburg to Jasper, Or., and from Silverton to Portland.

**Pennsylvania.**—The new branch being constructed by the company from its Schuylkill Valley road to A. P. Roberts & Co.'s Pencoyd Iron Works is rapidly approaching completion, and, but for two bridges, would probably be ready for operation during the present month. It is single track, and is over a mile and a quarter long. The branch is being built to afford increased shipping facilities to the Pencoyd Iron Works. The freight traffic from the works is said to amount to about \$10,000 a month. One of the unfinished bridges is a Platt iron truss bridge, 174 ft. long, and will span the main line of the Philadelphia & Reading Railroad, says the Philadelphia Public Ledger. It is being built at the Pencoyd Iron Works. It will rest upon piers of limestone 22 ft. above the Reading tracks. The other bridge is a wooden Howe truss 70 ft. long. The main chords of it are timbers of Oregon pine 72 ft. long, by 15 x 24 in. end measurement. This bridge will span the River road, and the lower chords will rest upon trestles high enough for loaded wagons to pass under. The Pennsylvania Company has experienced many difficulties in trying to reach the Pencoyd Iron Works. The Reading Railroad Company, County's Supervisor of Public Roads and property owners have repeatedly carried their opposition to the Montgomery County Court, where numerous preliminary injunctions, restraining the progress of the work, were issued. But in each case the Pennsylvania came out successful. Owing to the opposition of the Reading, the Pennsylvania's lines were changed from time to time, until they were forced out beyond the Reading's property into the Schuylkill River. The line of the present branch leaves the Schuylkill Valley tracks at a point 50 ft. above the Montgomery County end of the bridge crossing the Schuylkill, and skirts around the side of a hill at a curve of 20 deg., to a point along the Rockhill road 2,200 ft. distant. The cars will back off into the branch proper, running above the Reading road, and descending the regular grade of the trestle road 3 ft. to the 100, pass under the Schuylkill Valley bridge, around sharp curves along the 2,700 ft. of trestle work, which is built to conform with the windings of the river. Within

about 200 ft. of the Reading's Venice branch bridge the road strikes the level of the river road and passes under the Venice bridge and along the outer edge of the river road to the Pencoyd Iron Works. The new branch has cost a very large sum of money. Several handsome private dwellings along the line of the branch have been demolished. The plans were made by Engineer William H. Colesberry, and the work is under the supervision of his assistants, M. E. Hibbs, T. D. Coppuck and T. N. Badger. Andrew Brann built the long stretch of trestle work, and Patricius McManus contracted for the mason work and grading.

**Penobscot Shore Line.**—The company is now securing right of way for the proposed road of the Camden, Rockland & Rockport, which it has agreed to build. A new survey will probably be made soon from Rockland north along the westerly shore of Penobscot Bay to Camden. The distance is nine miles and the cost of the line is estimated at \$250,000. The blasting of the ledges along the shore will be done during the winter.

**Sherman, Denison & Dallas.**—Owing to the very soft condition of the grade on the road all tracklaying has been temporarily suspended, and will not be resumed until the weather will permit of its being carried on uninterruptedly for some time. It is the intention of the road to lay track on through Sherman, Tex., before stopping.

**Silver Creek & Dunkirk.**—The company filed articles of incorporation in New York last week to build a road from the village of Silver, in the town of Hanover, through Sheridan and Dunkirk, to the city of Dunkirk, 8½ miles. The capital stock is \$85,000. As already stated, the road is to be built with the idea of avoiding the heavy grade and the curves on the present Lake Shore road between Dunkirk and Silver Creek. It was intended to build this line under the charter of the Lake Shore & Michigan Southern, but this was afterward found impossible, and the organization of another company was necessary. Practically, the line will be merely a part of the Lake Shore. The new line will shorten the road 200 ft. between Silver Creek and Dunkirk. The grade will be less than 16 ft. to the mile.

**Skowhegan & Norridgewock.**—Both the Maine Central and Somerset roads have agreed to build this road on certain conditions. It is to extend from Skowhegan to Norridgewock, Me., about 12 miles, and it will connect with the two roads now offering to build it. The estimate of cost is \$66,000. The Maine Central agrees to guarantee 4 per cent. bonds to the amount of \$75,000, and operate the road when completed for a rental. The Somerset will build it if a certain sum is subscribed.

**Southern Pacific.**—Construction work will be resumed immediately on the line from Los Banos, in Merced County, to Armona, in Tulare County, Cal., 68 miles. This is an extension of what is known as the West Side road of San Joaquin Valley, which begins at Tracy. Armona is on the road which begins at Goshen and extends to Huron, west of Tulare. The grading was all done about two years ago, and it has now been determined to utilize the roadbed. The extension of the line will reach a large section of grain-growing country. On the completion of this line, and that from Oakdale, in Stanislaus County, to Poso, near Bakersfield, the Southern Pacific will have three lines traversing the San Joaquin Valley.

**Thomasville & Southern.**—The Georgia Legislature has passed the bill incorporating this company to build a road from Thomasville, Ga., south to the Florida State line to connect with the Tallahassee & Northern road, the Florida division of the line. The distance is 20 miles and the capital stock is \$500,000.

**Wabash.**—The Peru & Detroit, which was built by a local company last summer between Chili and Peru, Ind., nine miles, to connect the El River division and the main line of the Wabash, has been transferred to the latter company for operation.

**Weatherford, Mineral Wells & Northwestern.**—The tracklaying has been completed to Dry Creek. The stations are named Weatherford Junction, Lemley, Franco, Garner, Rock Creek and Mineral Wells, Tex.

**West Jersey.**—A survey was made last week for a line between Holly Beach and Sewall's Point, Cape May, N. J.

**Wheeling Bridge & Terminal.**—Work is progressing rapidly on the Chapline Hill tunnel, and the north excavation is now bored 1,100 ft., and the south opening 650 ft. This leaves about 800 ft. yet to be cut, which will probably take until the middle of January. A large force is engaged on the heavy retaining wall along Wheeling Creek, in front of the Whittaker mill. Workmen are building the toll houses on the Union bridge, and the bridge will probably be thrown open in two weeks.

**Wheeling & Lake Erie.**—On Nov. 29 the road will run its first regular trains over the extension from Portland Station, Jefferson County, O., to Steubenville, O. The road is practically completed to the city, and by the day for the formal opening the stations and other buildings, yards and sidings will have been completed. The work on the company's extension to Martin's Ferry is well under way, and three bridges, one over Deep Run, one over Glen's Run, and another over Short Creek, are now nearing completion.

#### GENERAL RAILROAD NEWS.

**Baltimore & Ohio.**—The annual report for the year to Sept. 30, read at the stockholders' meeting in Baltimore this week, gives the following figures: Earnings, freight, \$16,691,640; passenger, \$5,614,251; mail, \$519,500; express, \$554,132; miscellaneous, \$732,550. Total earnings were \$24,412,000, an increase of \$3,109,063. The expenses were: General, \$1,568,326; conducting transportation, \$8,979,088; maintenance of equipment, \$3,332,092; maintenance of way and structures, \$3,086,301. Total expenses were \$16,966,809, an increase of \$2,156,025. The net earnings from operation of property, \$7,445,220, and income from other sources, \$1,509,837; total, \$8,955,053. The balance, \$1,380,234, is an increase over 1889 of \$800,916.

A comparison of the fiscal year of 1890 with 1889 shows an increase in gross earnings of 14.59 per cent., operating expenses of 14.55 per cent., and net earnings of 14.68 per cent.; the tonnage moved, 13,938,176 tons, was larger than in any other year. The aggregate expenditures for construction and betterments were \$1,395,422. The balance of \$332,164 from the equipment trust of \$1,000,000 has been expended for 44 locomotives. Arrangements were



made for a five per cent. equipment trust of \$2,000,000. Of this sum \$258,532 has been expended for eight locomotives, ten passenger, three combination, four baggage and 120 freight cars. The company has now in the sinking fund its sterling loan due in 1927 and the Pittsburgh and Connellsville mortgage loan due in 1923, \$957,238. The investments for the main line sinking fund now amount to \$2,647,000 in consolidated mortgage five per cent. 100-year bonds, in addition to \$5,174,208 of other interest-bearing bonds. There is still due the city of Baltimore \$400,000, on account of the city's interest in the Pittsburgh & Connellsville road. The total payment on equipment trust bonds for the year was \$850,000. The mortgage to the city of Baltimore securing the \$5,000,000 loan was released upon its payment. The relief department has a membership of 21,920. The receipts were \$389,976; the disbursements \$323,880.

**Boston & Albany.**—The report of the company for the quarter ending Sept. 30 shows:

	1890.	1889.	
Gross earn.	\$2,369,480	\$2,386,233	
Oper. expen.	1,423,632	1,514,011	
Net earn.	\$945,847	\$872,222	
Interest, taxes, rentals.	212,313	218,099	
Net income.	\$733,534	\$654,123	
Cash on hand.	1,100,860		
Profit and loss.	def. 367,403	sur. 143,611	

**Central New England & Western.**—The report for the ten months gives the following figures: Freight and passenger revenue, \$342,796.48. The gross earnings aggregated \$388,308.98. Number of passengers carried was 289,413 and tons of freight 265,766. The passenger revenue was \$122,522 and freight \$220,273. The miles run by passenger trains aggregated 277,811 and by freight 191,838. The operating expenses were \$260,137. The cost of conducting transportation for the ten months was \$167,689; maintenance of equipment, \$34,661; maintenance of way and structures, \$15,624; salaries, \$29,220; compensation of engineers, \$27,322; the average daily wages for engineers being \$3.74.

**Delaware & Hudson Canal Co.**—The net earnings of the leased lines for the three months to Sept. 30, after paying fixed charges were: Albany & Susquehanna, \$63,137, a decrease as compared with the corresponding period of last year of \$55,821; Rennselaer & Saratoga, \$181,451, an increase of \$34,550; New York & Canada, \$32,476, a decrease of \$17,953; Adirondack, \$17,144, an increase of \$24,366.

**Frankford & Holmesburg.**—This road was sold by the trustee under the mortgage at Philadelphia this week and was bought in by a representative of the Pennsylvania for \$40,000. The road is a leased line of the Pennsylvania and extends from near Frankford to Bustleton, Pa., five miles. The sale was made under foreclosure of the \$50,000 bonds, the principal of which became due last January.

**Illinois Central.**—The following statement shows the earnings for the four months ending Oct. 31:

	1890.	1889.	Inc. or dec.
Miles operated.	2,275	2,275	
Gross earn.	\$5,643,593	\$5,025,470	I. \$618,123
Oper. expen. and taxes.	3,503,892	2,854,589	I. 649,303
Net earnings.	\$1,539,701	\$2,170,881	D. \$631,180

The Dubuque & Sioux City Railroad reports its gross and net income for the four months to Oct. 31, as follows:

	D. & S. C.	Cedar Falls & Minn.	Both roads, Inc. or dec.
Miles.	1890. 1889.	1890. 1889.	1890. 1889.
Gross earn.	\$804,137 681,871	36,558 35,006	840,635 717,477
Oper. expen. and taxes.	604,976 465,993	49,168 54,254	654,144 520,247
Net earn.	\$199,161 215,878	def. 12,610 18,648	\$186,551 197,230

**New York & New England.**—The earnings for the three months to Sept. 30 are shown in the following table:

	1890.	1889.	Inc. or dec.
Gross earn.	\$1,662,419	\$1,548,436	I. \$113,983
Oper. expen.	1,064,483	935,011	I. 129,472
Net earn.	\$597,936	\$613,425	D. \$15,489
Other income.	1,284	746	I. 538
Total.	\$599,220	\$614,171	D. \$14,951
Fixed charges.	448,394	421,291	I. 27,103
Surplus.	150,826	192,879	D. 41,953
Cash on hand.	101,797		
Profit and loss deficit.	435,613		

In the quarter the funded debt has increased \$661,000, most of which has been expended for new equipment.

**Old Colony.**—The statement of earnings and expenses for the quarter to Sept. 30 is as follows:

	1890.	1889.	Inc. or Dec.
Gross earn.	\$2,422,452	\$2,241,571	I. \$180,881
Oper. expen.	1,581,937	1,464,357	I. 117,580
Net earnings.	\$840,515	\$777,214	I. \$63,301
Other income.	55,471	175,701	D. 120,230
Total net.	\$896,986	\$952,915	D. \$55,929
Fixed charges.	427,825	423,418	I. 4,407
Surplus.	\$469,161	\$529,497	D. \$60,336
Cash.	571,904		
Profit and loss surplus.	560,397		

Includes premium on bonds sold, \$23,800. The surplus for the three months to June 30 was \$129,058, and the profit and loss account, \$515,958.

**Omaha & St. Louis.**—The company has just issued its report for the year ending June 30, 1890. The gross earnings were \$615,775; operating expenses, \$486,088; net earnings, \$129,686. The increase in gross earnings over the previous year was \$166,969, and in net earnings was only \$17,367. The president calls attention to the fact that comparatively few of the authorized issue of new second mortgage bonds have been subscribed for, and says: "As it had seemed absolutely necessary for the safe operation of the road to authorize considerable expenditures for betterments in anticipation of the bonds being sold, the failure of the stockholders to respond left the company with a floating debt."

**Williamsport & North Branch.**—In the equity suit of the company against the Philadelphia & Erie, a decision has been rendered by the Master, J. A. Beeber, in favor of the plaintiff. The dispute arose over the route surveyed for entrance into Williamsport, Pa., and was contested by both sides, the Pennsylvania Railroad objecting to the new line crossing its tracks. The Williamsport & North Branch and Lehigh Valley companies

are closely allied in the movement, and the object of the Pennsylvania was to prevent the Lehigh Valley from having an opportunity for extending its lines to this city. The case will probably be carried to the Supreme Court.

**Union Pacific.**—The earnings for September and the nine months to Sept. 30 were as follows:

	1890.	1889.	Inc. or Dec.
Mileage.	1,399	1,399	
Gross earnings.	\$623,236	\$610,422	I. \$12,813
Oper. expenses.	454,201	317,237	I. 136,964
Net earnings.	\$169,034	\$293,185	D. \$124,151
Since Jan. 1.			
Gross earnings.	\$5,508,694	\$4,738,672	I. \$770,022
Oper. expenses.	3,620,401	2,628,108	I. 992,293
Net earnings.	\$1,888,293	\$2,110,564	D. \$222,272

	1890.	1889.	Inc. or Dec.
Mileage.	8,028	7,990	I. 38
Gross earnings.	\$4,053,916	\$3,935,308	I. \$118,608
Operating expenses.	2,490,002	2,230,296	I. 259,706
Net earnings.	\$1,563,914	\$1,705,012	D. \$141,098
Since Jan. 1.			
Gross earnings.	\$32,703,585	\$28,934,427	I. \$3,769,158
Operating expenses.	21,992,564	18,039,511	I. 3,953,053
Net earnings.	\$10,711,021	\$10,894,916	D. \$183,894

## TRAFFIC.

### Chicago Traffic Matters.

CHICAGO, Nov. 19, 1890.

The Central Traffic Association has taken a measure to curtail excursion business by raising the former limit of 50 purchasers to 100, necessary to secure rates of a fare and a third. This is in conformity with the rules of the Trunk lines, Western Passenger and Southern Passenger associations.

It is said that the United States Grand Jury is in possession of figures tending strongly to show daily manipulations of grain rates extending over a period of six months. They prove from the buying and selling prices of the daily shipment of grain that tariff rates could not have been paid. This grain came over several different lines. Yesterday and to-day the Grand Jury was inquiring into this manipulation and it is believed that a number of indictments will be found at the end of the investigation. All the evidence is in regarding the Panhandle and Illinois Steel Co. manipulations. Opinion is divided as to whether an indictment will hold against the steel company in view of the fact that it sent a check for \$17,000, the full amount of the under charge, to the Panhandle after the irregularity was exposed by Secretary Rainer, of the Central Traffic Inspection Bureau.

While the Eastern lines have finally succeeded in bettering the traffic situation, it is a hard matter to say just what progress has been made by the Western lines. Those best informed are confident that after the financial situation becomes more settled the roads will unite in some line of action looking toward a more satisfactory and permanent basis. The plan of joint agencies advocated by Chairman Walker and others is looked upon with favor, but many of the managers and officials are inclined to look to Congress for a solution of the present difficulties in the way of associated action before any decisive steps are taken by the roads. It is hoped that Congress will not longer defer action upon the subject of pooling contracts.

The Western Freight Association has not yet disposed of the hog rate matter. Chairman Midgley has given notice of an adjournment until Nov. 25 of the meeting called for yesterday to adjust the rates on live hogs and packing house products. It is understood that in the meantime application will be made to the Commission to grant a temporary suspension of the order to give the roads time to adjust their rates. As stated last week, my information confirms me in the belief that a compromise basis will yet be arrived at which will not involve serious loss to the roads.

All the Chicago-Omaha lines except the Burlington have agreed to the new divisions proposed by the Union Pacific. The Burlington, having its own rails west of the Missouri River, thus far refuses to agree to the Union Pacific divisions.

The Northwestern passenger situation has become again complicated by the admission of the Chicago, St. Paul & Kansas City that it sold 4,000 tickets to the steamship agents last spring and is unable to withdraw them. Chairman Finley has given the lines until the last of the week to adjust their difficulties without obliging him to act officially, which would require him to authorize other lines to meet the rates now current in the offices of the scalpers who hold the 4,000 tickets in question. That Mr. Finley is in earnest in his endeavor to break up the business of the scalpers is evidenced by the alarm exhibited by the fraternity, who have now commenced attacking him through the columns of such papers as they can influence.

The manipulation of rates on coke shipped to the Illinois Steel Co. from Pittsburgh last spring over the Panhandle and Chicago & Alton roads, reported by Inspector Rainer and noted in these columns, has been investigated by the Federal Grand Jury, at the invitation of the Interstate Commerce Commission.

The Illinois State Board of Railroad Commissioners has notified the roads that it will order them to put the new uniform classification in force on Jan. 1, 1891. The Illinois Commissioners have thus taken an advanced stand, and it will be interesting to see how other authorities view their action. The change will involve the issue of new rate sheets by the Illinois roads, and the commissioners say that they will issue an order on this branch of the question later. A. C. Bird and J. M. Johnson have been appointed by the Western Freight Association members of the permanent board of classification.

The Central Traffic Association has given notice that in all cases where the official classification requires that articles therein specified shall take the same rates as grain, the rates to be thus charged are not the rates applicable to corn, but those which apply to wheat and all grains except corn. The Western Freight Association is not in favor of making lower rates on corn than on oats and other coarse grain.

Notice is given that on and after Dec. 1 the Chicago and St. Paul lines will not accept their proportion of through rates made upon the basis of 89, second class, between Chicago and St. Paul, which rate was withdrawn Nov. 1.

It is probable that the action proposed by the Pennsylvania at the last meeting of the Central Traffic Association, to make a uniform rate of two cents a mile on 1,000-mile tickets on its lines west of Pittsburgh after Dec. 1, will be adopted by the lines generally.

The movement of traffic as between the Southwestern lines, which at present have in effect an arrangement for the diversion of traffic, shows an increasing tendency to a normal distribution and indicates improvement in steadiness of rates. The October statistics are as follows (approximate):

	Westbound, per cent.	Eastbound, per cent.	Fast and West, per cent.	Total
Atchison.	22.	27.5		25.2
Alton.	11.5	14.3		13.2
Burlington.	18.6	16.8		17.5
C. M. & St. P.	6.1	8.7		7.7
Rock Island.	14.5	7.5		10.4
Chic. St. P. & Kan. City	7.6	3.4		5.1
Wabash.	7.8	8.5		8.2
Missouri Pacific.	11.9	13.3		12.7

### Traffic Notes.

The Florida State Board of Health has established a quarantine against Texas cattle.

A car service association is to be established at Scranton, Pa., to cover all the territory between Carbondale and Nanticoke.

The Western New York Car Service Association handled 37,128 cars in October, the average detention being 2.02 days.

The Florida Railroad Commission proposes to revise the passenger tariffs of the roads of the state and will give a hearing Dec. 1.

The Cleveland Car Service Association handled 38,540 cars in October, of which 76 per cent. were leased in 48 hours. The average detention is given as less than one day, which would seem to indicate that some classes of traffic are omitted from the records.

The shipments of fruit from California eastward this year have been very heavy, 33,000 tons of green fruit having been taken East up to Oct. 18 as against 22,000 tons during the whole of last year. Shipments of raisins have increased 28 per cent. Dried and canned fruit, hops and other articles are now offered in large quantities, and there is a severe scarcity of freight cars.

The New York, Lake Erie & Western has favored the season ticket passengers who travel to and from New York City by making the rate per month uniform for all the months in the year. Heretofore a new passenger had to pay a rate above the average for the first months and one as much lower the latter part of the year. At the beginning of the thirteenth month he had to begin over again, and if he omitted to buy a ticket for any one month he was treated as a beginner when he resumed. Under the new plan a regular passenger who intermits his trips for three or four weeks in any one month can save money by skipping one monthly ticket.

The National Transportation Association, composed of delegates from the leading Boards of Trade of the country, held a meeting at St. Louis Nov. 19, in the directors' room of the Merchants' Exchange. R. C. Grier, Secretary of the Peoria Board of Trade, presided, and George F. Stone, Secretary of the Chicago Board of Trade, was Secretary. A plan was proposed that a law be enacted fixing the time to be consumed in transportation between any two given points, and requiring the carrier to pay consignees a demurrage of at least \$1 per day for time in excess of the specified transit. This was submitted to the Executive Committee of the Association, with instructions to submit it to the proper Congressional Committee. The Association will hold its next meeting in February at Cincinnati.

The Wisconsin Central established a short time ago outside agencies at a number of prominent points east of Chicago. The agents were provided merely with order books and secured considerable business by shading the rates a little. The Michigan passenger association at once took steps to have the practice stopped and after failing to bring the offending road to its terms all Wisconsin Central tickets were turned to the wall at every station on every road that touches Michigan. Last week the Wisconsin Central people said they would withdraw the offensive agencies. Accordingly the boycott against it was raised last Saturday. Another field where order books are now as abundant as autumn leaves is in New York Central territory east of Buffalo. The Grand Trunk, Nickel Plate, Michigan Central, and other roads are said to be scattering order books with a most lavish hand in that well settled district. Passenger fares are in consequence quite feverish, and a little warfare is not unexpected.—Exchange.

### Party Rates on the Pennsylvania.

A rate sheet has been issued by the Pennsylvania lines west of Pittsburgh providing for parties of ten or more traveling together on the same train a rate of 2 cents a mile allowing 300 lbs. of baggage for each passenger. The agent of a party of ten will be allowed one free pass, and the agent of a party of 15 will be given two free passes.

### East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Nov. 15, amounted to 71,058 tons, against 66,634 tons during the preceding week, an increase of 4,424 tons, and against 64,282 tons during the corresponding week of 1889, an increase of 6,776 tons. The proportions carried by each road were:

	Wk to Nov. 15.		Wk to Nov. 8.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.	8,894	12.5	8,317	12.5
Wabash.	4,679	6.6	2,873	4.3
Lake Shore & Michigan South.	11,250	15.8	10,504	15.8
Pitts., Ft. Wayne & Chicago.	7,239	10.2	6,980	10.5
Chicago, St. Louis & Pitts.	11,510	16.2	11,252	16.9
Baltimore & Ohio.	3,971	5.6	3,103	4.7
Chicago & Grand Trunk.	8,673	12.2	9,293	13.9
New York, Chic. & St. Louis.	8,876	12.5	8,289	12.4
Chicago & Erie.	5,966	8.4	6,014	9.0
Total.	71,058	100.0	66,634	100.0

Of the above shipments 2,127 tons were flour, 29,198 tons grain, 6,795 tons millstuffs, 2,318 tons cured meats, 2,932 tons lard, 8,274 tons dressed beef, 861 tons butter, 772 tons hides, 290 tons wool, and 7,404 tons lumber. The two Vanderbilt lines together carried 40.3 per cent. while the two Pennsylvania lines carried 28.4 per cent. During the week the lake lines carried 57,660 tons, against 54,781 tons during the preceding week. Of the week's shipments 7,540 tons were flour and 44,729 tons were grain.